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GEOGRAPHY AND MAN

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CHAPTER I.

INTRODUCTION.

Physical geography and geology the bases of study—the influence of environment on man's occupations and intellectual development—natural conditions and the progress of civilisation.

To-day perhaps more than at any previous period, attention is being directed to the influence of his surroundings upon the life and activities of man. Scarcely a newspaper appears but contains a reference to slum clearance, housing schemes and the like. The treatment of criminals is increasingly becoming educative rather than punitive, since we are beginning to see that, but for their early environment, many of those who break the law might well have been satisfactory members of society.

Careful consideration of the facts of human progress and social development show that throughout man's evolution his destinies have been moulded by his surroundings. Knowing the conditions under which men have had to live it is possible, to a surprising extent, to account for their occupations, and, indeed, for their intellectual and spiritual development. The desert peoples few wandering and warlike, are as much the products of their environment as are the emaciated, tubercular children of the slums. Living creatures do not readily abandon the struggle for existence, and the effort to live under widely different

conditions accounts largely for the social and occupational divergences to be met with among communities in various parts of the world.

For man to rise above the level of a mere animal on two legs certain conditions are essential. First of all he must be assured of an adequate supply of the necessities of life, food, clothing and shelter ; the precise minimum limits of each will depend a good deal upon the climatic conditions of the region in which he lives. But until his elementary needs are satisfied he cannot devote attention to other things. One of the notable and recent developments which illustrate this has been the provision of meals by the State for children in the primary schools in the west. It has come to be realised that children cannot be expected to attend to their lessons if they are hungry ; but that when they have been fed then comes the teacher's opportunity to help them to appreciate other things. Similarly progress is well-nigh impossible amongst people who have to spend all their time and energy in a constant struggle to get enough food, whether in an ill paid sweated industry, or amid the natural difficulties which face the Fuegian or Eskimo. Man must have a certain amount of leisure. Thus of the primary occupations, pastoral activities and agriculture offer the best facilities for human development. Nevertheless, too much leisure may be as undesirable as too little.

The negroes have never achieved very much as a race ; they have been characterised rather by a lack of zeal and

enterprise. This is perhaps, largely to be accounted for by the fact that the cultivable areas in the tropics are so very productive that a man can live quite comfortably by doing a very little work. There is thus ample leisure for the negro cultivator who has, amid such an environment, tended to become easy-going and not given to hard strenuous effort. Such a leisurely "happy-go lucky" existence does not tend to promote the mental growth of the people. Just as muscles are developed by physical exertion so the other faculties need to be exercised if they are to improve. An environment therefore most favourable to man's progress is one in which conditions are such that effort is needed if he is to live. But these conditions must not be overwhelmingly difficult or man will be defeated by them. It is where nature is neither too lavish nor too severe that humanity has the best chance : the peoples who have shown the greatest progress have, for this reason, been those who have lived in the temperate regions.

Now in studying the effect of environment on man's development the first factor we shall consider is the nature of the earth's surface, the effect that is to say, of Physical Geography. The importance of this factor is sufficiently obvious. The man who lives on a high grassy plateau will have a different mode of living to the man who lives in a low-lying alluvial plain. But there is another and connected factor, Geology, whose importance is not so obvious. One or two examples, however, will serve to

indicate its scope. Geology is the study of the structure of the earth, and is the chief source of our knowledge of the geography of the past. Thus areas which thousands of years ago were covered with dense primeval forests, are to-day coalfields, centres of dense populations and great industrial activity. Again the fertility of a wide valley with a small river running through it, now a valuable agricultural region, owes its productivity to the fact that at one time it was the bed of a large river which brought down quantities of alluvial matter. As time went on, by a common phenomenon in the evolution of rivers its waters were diverted, leaving a wide area available for human settlement. Thus the welfare of the communities in that region to-day is directly related to the fact that a great river was "beheaded" long ago. Geological, as well as geographical conditions have therefore to be taken into account.

When we have completed a brief review of these factors we shall next require to study the primary occupations of man—hunting, domestication of animals, agriculture—in relation to the particular environment in which each has developed. This may be most conveniently done by considering the conditions under which certain communities of each type have evolved, and how it may happen that one occupation may gradually be abandoned in favour of another, with consequent changes in the social organisation. From this it will be the more clearly seen how man follows the line of least resistance and pursues that

occupation which will best enable him to exist under the particular conditions with which he is faced. Again it will be found that after ages of existence in a particular environment, it is a long and difficult, and sometimes impossible, process for him to adapt himself to conditions widely differing from those to which he has for so long been accustomed. The Amerind,* the Australian aborigines, the brief dominion of the Moors in Spain all provide instances of what may be termed "environmental inertia."

It is not only among small, thinly scattered primitive communities, that the influence of natural conditions is noticeable. Centres of population and the more advanced occupations such as deep mining and manufactures all bear witness to the same influence. A moister climate in one part of a country than in another may well bring about differences of occupation. Town sites are not selected by chance but because, for some reason or another, the particular spot chosen is the best in the neighbourhood for the concentration of population. The very shape and nature of the dwellings depends, as we shall see, upon the kind of materials available, and on the climatic conditions. Environment is just as potent a factor in the lives of men in Calcutta as in the Thar desert.

Not only in material things but also in matters of the intellect our surroundings are of importance. The countryman for example tends to be an individualist while the townsman is far more given to various forms of human

* American Indian.

co-operation. It is a well-known fact that trade unionism flourishes in the great towns of industrial regions, but to secure combination between agricultural workers is a very difficult matter. A well-known writer has remarked upon the brilliant red colouring to be found in the paintings of the Venetian artists in comparison with those of other parts of Italy. In this respect their work resembles that of the Dutch, and, curiously enough, Venice is the only place in Italy which is subject to fogs, which are very common in Holland.* May we not reasonably conclude that there is here a connection between weather conditions and art ?

From a consideration of small and large communities in their separate and isolated development we shall proceed to the case in which both develop side by side in the same country although along different lines. In dealing with this we shall have to trace the growth of civilisation from the earliest times to the present day. The history of that growth will clearly show how false is the common idea that civilisation is entirely the outcome of man's own efforts. The truth is that it is the result of the interaction between man's own efforts and the influences brought to bear upon him by his surroundings.

An excellent illustration of this is proved by a comparison of the Greek and Aztec civilisations and their influences upon the progress of the world at large. Greece was well placed for the dissemination of her culture, and

* Hamilton, *Vanished Poms of Yesterday*

was also favoured in this respect by the period of peace which the rule of Rome gave to the Mediterranean lands. The Aztecs on the other hand lived on a high plateau more or less completely isolated from the outside world by a ring of low-lying tropical forests which rigidly limited their expansion, since the cereal crop upon which they depended could not be grown at the lower altitudes. Both peoples produced great civilisations and culture. But, owing to their geographical isolation, that of the Aztecs is dead, while the influence of Greek thought and culture upon the world of to-day is hard to over-estimate. The suggestion that the difference in the contribution made by these two peoples to civilisation in general is due to a difference in their inherent worth is clearly false.

Other problems for which we may find solutions are why certain peoples have spread by land while others have done so by sea, and how it is that, in the story of civilisation, the movement has in the main been towards the west.

Slavery is another subject which we shall have occasion to consider in connection with the development of civilisation. We shall find that in its origin, and therefore in its effect, it is the outcome of an agricultural environment, and is therefore intimately connected with one of the primary occupations of man which have already been dealt with. This will mean, in so far as the connection can be established, a tracing back of slavery and all its very important results to an environmental factor.

Again a study of colonisation will give us further illustrations of the far-reaching, and fundamental character

of the influence exerted on man's history by his surroundings. There are three distinct points at which the forces of environment are effective. In the first place the history of the natives of the country before the arrival of the settlers can be treated and the influence of external conditions indicated. Then, secondly the qualities of the settlers will be largely due to the surroundings from which they have come. And, lastly, the development of the two natives and settlers side by side, will depend greatly on the conditions of life in the colony—conditions which are now common to both groups. A review of the facts of colonial history on these lines will show that much of it can be accounted for by a study of the geographical conditions.

Up to this point we have been occupied in pointing out and emphasising the effect upon man of his environment, and we may have been led to the conclusion that man is but the helpless product of external forces. It may be that this is true to a greater extent than is often supposed, but it is not the whole picture*. In common talk it is the influence of heredity which is compared and contrasted with that of environment. But this is only another external force, and, in the last resort, can be traced to the conditions of life of our remoter ancestors. How far is man the puppet of these tremendous factors in evolution? If we

*"The geographical environment offers opportunities of which man may or may not take advantage, present difficulties which he may or may not overcome. It does not determine his life, but it exercises a certain control over his activities."—*Brown, Howarth and Musfarlane Scope of School Geography.*

look at the animal kingdom we see that the higher the species in the scale of existence the greater is its adaptability and, finally when we come to consider man, we find he has this adaptability in the greatest degree of all. Here we see him as the highest member of the animal kingdom. But there is more than that. For of all created things man alone is capable not merely of striving against his environment and adapting himself to it, but also of modifying it to a very great extent. He often succeeds and has succeeded, by his knowledge of the forces which surround him, in changing his environment to his own advantage. He is not always the loser in the battle with circumstances, and attains at least some measure of success in overcoming them and changing them. Innumerable illustrations could be given, both in general and in particular. There are many regions throughout the world which were once barren and deserted which have been rendered fertile and thus habitable by the use of artesian wells and scientific systems of irrigation. Modern methods have made habitable lands where formerly the ravages of disease were enormous. When the French attempted to cut a canal across the Isthmus of Panama the death rate from disease among the workers was appalling.* It

* The family of one of the chief engineers consisted of five, four died by yellow fever seventeen engineers came in one steamer, sixteen of these died of yellow fever. Twenty-five Sisters of Charity (nurses) came to Ancon hospital at one time, twenty died of yellow fever.....one-third of the Frenchmen who came to the Isthmus during the French construction died of this disease".—Col. Gorgas (quoted by G. F. Adams : *The Panama Canal Zone*).

has been estimated that when the railway was built from Colon to Panama a man died for every sleeper that was laid, so deadly was the climate. The first thing the Americans did when they had decided to construct the canal was to make the region habitable for the workers by the employment of the most up to-date methods for preserving health in the tropics. Thanks to their efforts in this connection the canal was completed and the workers and officials have been able to live under conditions of reasonable comfort and safety. Drainage and various methods for the destruction of the mosquito and other insect-pests have indeed worked wonders for the health of people in the tropics. Again there is a striking exceptional example of man's power—even over climate, to be found in Mexico. The healthiness of the city of Acapulco has much improved by the cutting of a cleft through a rocky barrier so that the purer air from the sea can get in.

As man progresses he becomes less and less the slave of his surroundings. New means of communication and transport, fresh methods of harnessing the forces of nature all help him to rise superior to his environment. The householder in an Himalayan hill station receives his letters through the post almost as regularly as if he were in Calcutta or Bombay, and he can read his daily newspaper by electric light generated by water-power from the neighbouring mountain streams.

Nevertheless, although all this advance has been made, man is very far from being independent of Nature. However

artificial may be our immediate surroundings, we are living in a world where most of the forces of Nature are beyond our control and we cannot escape their influence.

These forces, thanks to man's scientific achievements, may not affect any of us directly but they are at work and are easily perceptible even in this twentieth century if we will only look deeply enough to discover them. One of the greatest difficulties with which Calcutta and New Orleans both have to contend is that of drainage. This problem is entirely the outcome of their geographical situation. The low level of the land bends to prevent the outward flow of the water and waste material. Transport in certain parts of the State of Illinois is greatly impeded by the bad state of the roads owing to the fact that there are no supplies of proper material within easy reach of these regions. Again climatic extremes and the sterility of the soil are almost insuperable obstacles to the prosperity of the central region of the Iberian peninsula.

Man has, it is true, overcome many of the difficulties with which he has been confronted. No longer is the West Coast of Africa the white man's grave and Central America to-day in many places is healthy compared with what it was years ago. But Nature is, however, by no means wholly conquered and man's environment still counts for much among the influences by which man's development is moulded.

CHAPTER II.

THE EARTH'S SURFACE.

The influence of weather action and earth movements—Plains—Plateaux—Mountains.

The earth on which we live is a sphere, slightly flattened at the north and south, situated in space. It is one of a group of bodies having a definite association with the sun. The earth spins round on its axis making a complete revolution every twenty-four hours, thus bringing about the alternation of day and night. Besides this it also moves in an elliptical path round the sun, completing the circuit in a year, as a result of which we get seasonal variations of temperature in the northern and southern hemispheres.

The relation of the earth to the other bodies in the Universe is mainly the concern of the astronomer, and the study of the conditions below the crust of the earth is a matter for the geologist. The geographer deals with the conditions which affect the existence of man on the earth's surface; he is only interested in external and internal conditions in so far as they may modify the surface conditions.

The surface of the land is being continually worn down by the action of the weather, *i. e.*, water, wind, and heat and cold. It changes too by the action of cooling that goes on at the earth's centre. Ocean beds, on the other hand, are being built up; they also are affected by the

shrinking of the earth on account of its cooling. This wearing down of the land is modified by the fact that in parts the surface is being raised by the earth's shrinking while elsewhere by the same means it is being lowered. As far as we know this also takes place on the ocean floor. Rocks are of two kinds ; stratified *e. g.*, limestone, sandstone, shale and conglomerate (petrified shingle), and crystalline. Stratified rocks are grains of rock, sand and mud pressed together and solidified. The grains are waterworn and contain pebbles and boulders. In these rocks are found fossils with the organic matter washed away by water and replaced by material the water had in solution. Stratified rocks are also termed "sedimentary". They are old sediments that have been washed into the sea and then raised above the surface of the water. Probably all land surfaces were once below the sea. Crystalline rocks, *e. g.*, granite, originated under conditions of great heat, for which reason they are also called "igneous". They have been forced up from lower levels in a molten state and then cooled and crystallised. Some, called "plutonic", were solidified far below the earth's surface, while others, "volcanic" have been consolidated at or near the surface.

Rocks are classified by epochs in geological time. The age of the sedimentary or stratified rocks can be gauged by the fossils they contain, but igneous rocks having been produced under conditions of great heat contain no fossils so that the only method by which their age can be measured is by nothing that of the sedimentary rocks above and below them.

As stated above changes on the earth's surface are brought about by two forces : weathering and the motion of the land on account of the shrinkage of the earth. The sediments deposited on the ocean floor are fairly evenly distributed but on the land they are contorted, twisted, folded and cracked. They can be traced by exposures on coasts and river-banks. These contortions, and twistings and foldings give rise to the various land forms with which we are familiar.

The geographer is principally concerned with the effect of these land forms (*i. e.*, plains and plateaux, hills, mountains, valleys, rivers, lakes, basins and coastlines) on man. Primarily these are due to changes in the structure of the earth, subsequent modifications being due to weathering. The smaller features are frequently due to climatic (or weathering) effects, *e. g.*, hot deserts and cold deserts (ice sheets).

By the action of the waves on a rocky coast a plain is formed beneath the sea. The rocks are worn away by the waves and the sediment thus produced sinks to the sea bottom. In the course of ages the sea floor may rise and the plain thus formed become habitable for man.

In the case of a coastal plain the rivers will flow in shallow valleys the depth of which will depend upon the height of the plain above sea-level. Their courses owing to the very gradual slope of the plain will be winding and they will tend to split up and form deltas and tributaries. *e. g.*, the mouths of the Mahanadi, Godavari, and

Mississippi. It is to be noticed that on an " old " (rocky iron-bounds) coast the river mouths form indentations while on a " new " one (coastal plain), they form projections. On the edge of a coastal plain there will be few harbours as the water inshore is shallow and there are no sheltered anchorages. The beaches are smooth and undulating so that there are considerable hindrances in communication between sea and land.

Coastal plains consist of new rocks which disintegrate rapidly into soil and thus encourage agriculture. There is a good supply of water from the rivers and where the valleys are shallow irrigation, if required, can easily be developed. Owing to the generally level surface roads and railways can cross the region in every direction.

As time goes on the plain continues to grow and the back parts become much higher and the rivers cut deeper valleys and differences in climate between the inland and coastal regions may produce differences in vegetation.

Because the rocks of a coastal plain crumble so readily into soil that they do not provide good material for building purposes, but this difficulty may be overcome if clay for making bricks can easily be obtained from hills further inland. In these " new " rocks there are no minerals so that a coastal plain is not as a rule an industrial region.

Sometimes coastal plains sink beneath the sea when the sea first inundates the river valleys forming new estuaries ; the shore now becomes irregular and much more indented and the water off the coast is much deeper.

The estuaries provide splendid facilities for deep water seaports and, if the sinking of the plain continues, the ports can be well inland and big towns and seaports will arise. Land communications will be easy except that roads and railways must avoid the larger estuaries.

It is difficult in some cases to detect the existence of such a plain, *e.g.*, when it is in the heart of the land, far from the sea. Ridging up of the land between the plain and the sea may have occurred and this region of elevated land may further have been modified by weathering.

Another form of coastal plain is produced where a large number of rivers carrying much sediment flow out into a shallow sea. In the course of time the sea may be filled up. This phenomenon is of frequent occurrence but only on a limited scale, *e.g.*, Gulf of Trieste ; Ravenna now high and dry was a great seaport in Roman times. At the mouth of the Humber "Sunk Island" has grown within the last few hundreds of years and risen above the level of the river. Plains of this type are local, wet, and marshy, and unsuitable for settlement. They are closely associated with deltas. Rivers having a strong current and carrying sediment do not always deposit this sediment at the river mouth but it may be borne along the coast for some distance and then dropped forming a triangular projection of the shore.

Plains are also formed by deposition, erosion, denudation and marine or river denudation.

Plains of marine denudation differ considerably in structure from ordinary coastal plains. They are formed of "old" strata standing vertically, not covered to any extent by new deposits, and are produced in a region where the land is sinking, by the sea cutting away the edge of the coast. Erosion is a quicker process than denudation and it is by this means that the sea gains most rapidly on the land. Beneath coastal waters the rock surfaces are irregular in structure unless the sea-floor is covered with extensive deposits. There are here no horizontal strata. If the ocean bed were elevated there would be a plain cut out of strata.

Plains form a large portion of the earth's surface and exercise much influence on man's life and activities. Usually on the plains the climate is more favourable for human existence, transport and communication are easy, and in most cases access to the sea is not difficult.

In the old world the greatest plain is in Western Siberia stretching from the Arctic regions to Afghanistan. The people of North America are centered mainly on the interior plains and on that bordering the Atlantic coast. In India the Indo-Gangetic plain is the most densely populated region, thanks to the alluvium which has been deposited by the Ganges river system. The great northern plain of Europe, extending from Siberia, unbroken save for the low elevation of the Ural Mountains to the Atlantic, and in part consisting of shallow valleys between the Baltic ridges, has for ages been a notable east and west

G. M.—2.

route. In the west where the north-east route through the Gate of Orleans and that from the Mediterranean *via* the Rhone valley converge upon it arose as a result, Paris one of the world's most cosmopolitan centres.

Plateaux are formed when plains are raised to some extent above the neighbouring land. This elevation is the only real difference between a plain and a plateau. All plateaux are formed by "uplift", *i e.*, the elevation of the earth's surface. One form which is not found in the case of plains is that resulting from the accumulation of volcanic matter. These arise where the lava has emerged from numerous fissures and rents in the ground rather than from a single cave, so that a large area has been covered and the surface level has been raised. Thousands of square miles in the north west of India are covered by a layer of lava which varies in thickness from one thousand to five thousand feet.

On account of their elevation plateaux are liable to rapid erosion by rivers and become cut into great "earth blocks." Since the surface of the plateau is fairly level the rivers will tend to follow a winding course; the valleys they cut will consequently be winding and irregular. The Great Colorado Plateau in the south-west of the United States is cut up by many deep canons with nearly vertical sides, between these are huge earth blocks, the remains of the old plateau. Geologically such a plateau is young. An old plateau is one that has been reduced by weathering and water action nearly to base level. *i e.*, practically to

a plain, and is known as a "Peneplain." If this subsequently becomes elevated, the whole process or "cycle" will begin over again. In the Colorado region there is but little rain, the rivers flow down from the Rocky Mountains beyond, and they are practically the only modifying force at work. In a moist climate the edges of the canons and ravines would be worn away so that the outlines of the earth blocks tend to be more rounded.

A plateau divided by river action is of little use for settlement because access and communication are difficult. Travel is only possible at the bottom of the canyons and down stream on account of the swift current of the water. In a dry region also, agriculture is impossible and irrigation cannot be developed as the water-supply is far—sometimes several thousand feet, below the surface of the plateau. Provided that the climatic conditions are suitable, the older the plateau the more favourable will be the conditions for human settlement as, in the course of time, if there is a good rainfall, the plateau will become a series of more or less of parallel mountain ranges with fairly wide valleys in between. These valleys will provide areas of human settlement. With regard to man both the elevation and the latitude of a plateau region are of the utmost importance. In Mexico and Africa it is the upland areas which are best suited for habitation as they are both cooler and healthier than the coastal regions, while in the highlands of Scotland—a very old and much denuded plateau, the population is to be found mainly in the valleys. The

climate of the Tibetan Plateau is extreme and life is arduous, so that the people are few and unprogressive. This plateau is one of accumulation formed by the debris washed down from the mountains of Central Asia.

A peneplain—a plateau reduced by weathering to base level, can be distinguished from a coastal plain by the fact that it consists of old (hard) rocks which do not easily disintegrate into soil, so that it is not an area suitable for agricultural development. On the other hand it may contain minerals so that there may be possibilities of mining and large scale manufacture. If a peneplain is depressed it may eventually be covered by sediment and there may be a coastal plain formed above it. Central Russia is a peneplain, while the Deccan, Arabia and Western Australia are plateaux. The African plateau and the whole of Asia except the extreme north and south were, ages ago, connected to that of the continent of Gondwana-land or Lemuria, these names being derived in the first instance from the rock of the Gondwana region of India, and in the second from presence of various specimens of the family of *lemuridea* (lemurs).

Many of these old plateaux have been changed by weathering into areas of hills or mountains. The plateaux of Scotland, Scandinavia, the extreme north-west of Ireland, Iceland, Greenland, Labrador, part of Newfoundland, and possibly the Appalachain mountains of the United States of America, are the remaining portions of an old continent called Arctis. The plateau of Antarctica about the region

of the south pole is deeply covered by ice and snow rendering it impossible for human habitation and having no effect upon man except in so far as it influences the climate of the southern hemisphere.

The terms hills and mountains are relative and there is no sharp distinction between the one and the other. Sometimes for convenience the term "A hill" is applied to elevations of less than 2,000 feet. From the geographical point of view no distinction is really necessary.

Elevations of this kind are produced by the accumulation of material on the earth's surface, by upheaval, by dislocation of strata, and by the denudation of strata as for instance, in the case of an old plateau. Those formed by the first three agencies are "tectonic" or "original" mountains as they are due primarily to earth movements; the last or "residual" mountains are "subsequent" and forms, due to the action of the weather. Mountains of upheaval or fold mountains are formed by the strata being ridged up.

The movement is very slow and imperceptible. As the ridging up continues the effect of weather and water are increased. The land-form is thus partially due to weathering but primarily on account of upheaval. This upheaval or ridging up occurs owing to the cooling of the earth. In some cases the folds remain perfect, but frequently they crack and break. Symmetrical folds are rarely found and unless the cooling effect is very slow secondary ridges occur. All ridges are subject to the

action of the weather. If this ridging up continues for a very long time the ridges may fold back one upon another.

A fold of this nature is known as an "overthrust". As these are common in the Alps the term "Alpine" is sometimes employed.

Folded mountains are usually very complex in structure and bear little resemblance to their original form. Parallel and continuous ranges are rare. The greater the number of ridges the greater is the barrier to communication. At the top of the folds the effect of weathering will be the greatest the waste being swept down into the valleys below. The extent of the influence of weather action will depend upon the elevation, the amount of rainfall, the magnitude of temperature variations between one season and another and the hardness of the rocks. As the softer parts are worn away the harder will remain and ultimately form peaks, so that as time goes on the ridges will disappear being replaced by a succession of peaks. Where the weathering action has been powerful and prolonged the original fold may have been worn away to such an extent that the top of the existing mountains may consist of what was formerly the bottom of the original valley. In such cases the mountains may be considered to be residual since they are composed of the material that was washed down in bygone ages from the original mountains.

The majority of great mountain ranges are folds and date from a comparatively recent geological period. Among these are the Alps, Caucasus, Himalayas, Atlas, the

Rockies and the Andes All of these are situated near great depressions of the earth's surface, *i. e.*, oceans.

Mountains of dislocation or block mountains are tectonic, modified only by weathering. They are mainly formed by faulting and some blocks have slipped down and others have been pressed up. This form is not frequently to be found, but among others may be mentioned the Coast ranges of North America and the Cordillera further south. The blocks that have slipped to a lower-level have sometimes become submerged below water level and the others left isolated above. These are termed "~~horsts~~" *e. g.*, the peninsula of Korea and Ruwenzori.

Residual mountains are not found in ranges or in any definite arrangement as instanced in the old plateaux. They can easily be recognised by the fact that the strata bears no relation to the slopes of the mountains. The surface is usually fairly even. Peaks are to be found among them but more frequently the outlines are smooth and rounded. Owing to weather action the old strata often become exposed and since in them are often mineral deposits a residual mountain region may provide facilities for industrial development. The destruction of volcanoes may result in the formation of residual mountains. The side of a volcano is sloped and exposed to the air while the lava inside the cone is solidified under pressure away from the atmosphere, the interior portion thus becomes very hard and able to resist weathering. The outer portion is gradually worn away and the centre or "plug" is left standing as an isolated peak. This often provides a suitable site

for a fort guarding the route through the valley below, and round this fort a town may subsequently arise, *e. g.*, Castle Rock, Edinburgh.

The various forms of weather and river action on the earth's surface are known as "sub-aerial" in contrast to that of the sea, termed "marine". The effects of the former are more rapid than those of the latter as the sea can only act upon a restricted surface.

Volcanoes are rare instances of violent natural processes and have but a slight influence on man. Lava is not emitted by all nor in any case do flames rise from the craters. The greatest danger to man arises from the emission of mud composed of ashes and steam. If the lava is very liquid the slope is easy, while if the flow is sluggish steep slopes are formed as in the volcanoes of the Hawaiian Islands. Volcanoes are frequently of enormous height; those in the Pacific Ocean rise from the ocean floor. In most cases it is difficult to determine whether a volcano is extinct or not as eruptions may occur after long periods of quiescence. In 1883 Krakatoa in the Sunda Islands suddenly erupted after having been long dormant. The top was blown off causing great damage and much loss of life. The noise of the explosion was heard 2,000 miles away. It is only when there are no traces of activity within recent geological times that the expression "extinct" is applied. Volcanic regions generally lie along lines of faulting or folding on the earth's crust, *i.e.*, where the strata is stretched and weakened. The Pacific Ocean is bordered

by a ring of volcanoes which are the remains of a folded range of mountains. Another fold region where there is much volcanic activity is in the Malay Archipelago and the islands of the East Indies, Java, and Sumatra. Both the Indian and Atlantic oceans are fairly free from volcanoes; in the former the chief region is that of the West Indian islands. In Europe also there are but few, principally in Iceland. At one time there were active volcanoes in the highlands of Scotland; now volcanic activity is still prevalent in the Mediterranean; in southern Italy and the Greek Archipelago. Volcanoes are caused by molten rock being forced through lines of weakness in the earth, the melting being due to heat or the lowering of pressure. Earthquakes also occur in these folded and faulted areas.

High mountain ranges act as barriers, climatic and human, between lands. Traffic is limited to the passes, and if these are at a high elevation, they may at times be useless owing to climatic conditions. In the Himalayas there are no passes so that these have never been traversed by invaders; the Pamirs are almost equally impassable. There are passes through the Hindu Kush but in winter these are blocked. Through the Pyrenees the passes are difficult to traverse but there is a lowland region at each end which gives access to the Iberian Peninsula from France.

Mountains check the migration of peoples and frequently provide refuge for the original tribes of the neighbouring regions. They promote conservatism, and preserve old customs. The history of ancient Greece and Rome shows how mountains are obstacles to the unity of the people.

CHAPTER III

THE EARTH'S SURFACE (*continued*)

Valleys—Rivers—Lakes—Coastlines—Soils.

Of valleys there are three kinds. *viz.*, downfolds in mountain areas, *i.e.*, synclines, these are tectonic and are due to structural causes ; valleys of dislocation or faults, and river valleys formed by erosion. The first kind are of rare occurrence and the bottom of the valley is nearly always subsequent being covered with alluvial matter, occasionally the valley is filled up and a fresh valley of erosion is cut in it. This has occurred in the lower Thames valley where the river has cut out its path in the clay which had been deposited originally in a downfold between the Chiltern Hills and East Anglian heights on the north and North Downs on the south. The fountains in Trafalgar Square, London, are supplied from an artesian well sunk down through the clay to the chalk beneath.

Valleys of dislocation are common. The largest is the basin of the Atlantic ocean. The valley of Glenmuir in Scotland in which the Caledonian Canal has been cut running from north-east to south-west through the Highlands, is a simple fault valley ; one side slipped down, the other was forced up subsequently it has been modified

by weathering. In the great Pennine fault the river Eden has formed its own small valley in the great fault valley.

Dislocation is often in the form of two parallel faults or cracks where the centre portion becomes depressed and a rift valley is formed. The fiords on the Norwegian coast are probably valleys of this type moulded subsequently by ice and water. A great rift valley occurs in Palestine ; it continues through the Red Sea down to Lake Nyassa having a branch in Africa to the north-west. In this lie the sea of Galilee, the Dead Sea, the Red Sea, and Lake Rudolph ; in the north-western branch are lakes Albert Edward and Tanganyika (it should be noted that rift valley lakes are always long and narrow). This valley is of great importance to Africa owing to the formation of the Red Sea. When this valley foundered, *i.e.*, was depressed Ruwenzori was left towering above.

The commonest form of valley is that formed by erosion.

The rate of erosion tends to vary greatly in different parts of the same river. It will depend upon the slope, the kind of rock, the rainfall and the proportions of the course which are young, mature and old. Matter is carried in solution as well as in suspension. Of the material carried down by the Thames no less than 1,500 tons a day are carried in solution, while the Mississippi brings down several million tons each year. Estuaries are formed by the drownings of old rivers by the depression of the land. If a coastal plain is formed two or more

rivers hitherto independent may become united and flow into the sea by a common mouth. This has occurred in the case of the Mississippi and its tributaries. These new tributaries are said to be "engrafted". Usually they are navigable.

The amount of material a river can carry depends upon the speed of the current. If the current is checked deposition will occur. A current of eight miles per hour will move boulders four feet in diameter along the river-bed, while one of two miles per hour will transport stones of the size of eggs. An old river meandering along at half a mile an hour will only carry fine sand.

In the case of a long river having a number of short swift tributaries, a great deal of material reaches the main stream and is deposited at the mouths of the tributaries, spreading out in a great alluvial "fan". If these fans are numerous they may cause the main stream to wind and if they are all on one side the river-bed may be pushed across the valley. This has occurred in the case of the Ganges whose bed has gradually been shifted to the south. A fan of fine material will provide an area of fertile soil and be suitable for agricultural settlement but it will be liable to flooding and difficulties may arise should the river change its course. Fans projecting from opposite sides from a river may meet and bring about the formation of a lake which may be permanent or temporary.

Material which is deposited at the side of river from *river terraces* (on the sinking of the river-bed). As the

current of a flooded river is slower in the flooded parts. Material is deposited here which raises the river banks. When this has occurred the plain slopes down away from the river and it is often necessary to build dykes to prevent flooding. The greater part of New Orleans at the mouth of the Mississippi is below the river level and is surrounded by embankments. This renders drainage difficult and makes the town unhealthy. Shipping approaches through channels through the delta.

A flood plain is formed on the land which is covered by the flood water of a river. One of the largest flood plains in the world has been formed by the Hoang Ho (Yellow river) in China. This joins Shantung to the mainland, and carries a very dense population (800 to the square mile). The land is very fertile but is liable to floods, and the river is apt to change its course. This causes much damage and has given the river the name of "China's sorrow". In 1888 a million and a quarter people lost their lives by drowning and starvation owing to the destruction of crops. The only really useful part of Egypt is the flood plain of the Nile where the river deposits four or five inches of fresh soil on the land every year. Mesopotamia consists of the flood plain of the Tigris and Euphrates.

Deltas are continuations of flood plains and are formed at river mouths where the sea is shallow and generally calm. Sometimes in a delta, the river banks become piled up and lagoons appear between the channels. Deltas

impede navigation as there are no landmarks and for the movement of shipping lights, beacons and dredging are necessary. The mouth of the Colorado was formerly higher up the Gulf of California than at present and the head of the gulf was cut off by a delta forming the Saltoun Sea. By means of channels this area was drained and made available for agriculture

Rivers were man's first highways before roads were constructed. They greatly facilitate the export of timber which can be rapidly and easily floated down from one point to another. Old and mature rivers with their slower currents provide the best facilities for navigation. A river with its branching tributaries provides a means of unifying an area of land.

In the south of England the counties generally lie in river basins and in olden times the county town usually at the then head of navigation was the administrative centre. If a river is very wide it may divide a region, *e. g.*, along the Danube there are a number of towns on each side having little to do with each other owing to the river flowing between. If rivers lead to nowhere they neither promote settlement nor exploration, *e. g.*, the great rivers of Russia, the Yenesei, Lena and Ob flow into the Arctic ocean and are closed by ice for nine or ten months in the year and are thus useless except for communication between villages. Africa is particularly unfortunate in that all the rivers except the Nile are blocked by rapids and waterfalls. The Indian rivers are of little use for navigation as the amount

of water varies greatly from season to season, and in most cases their mouths are obstructed by deltas.

Lakes are formed by earth movements, volcanic action, solution, the accumulation of material, and erosion. Earth movements give rise to lake basins where faults occur as for example in the great rift valley running from Palestine into Africa. In some instances no fault has occurred, but the land has sunk, *e. g.*, the Great Lakes of North America, Lakes Ladoga and Onega in Russia and the Caspian Sea. The Mediterranean Sea was originally two lakes which were formed when the Alps were raised. Volcanic action gives rise to lakes by the accumulation of water in old volcanic craters. As the edges of crater are worn away by weather action the lake disappears. The water may percolate through the bed of the crater and coming into contact with the molten mass below may cause fearful eruptions. The disasters at Herculaneum and Martinique were apparently produced in this way. Sometimes a lava stream may block up a valley and cause a lake to be formed. In such cases the lake is only partially caused by volcanic action, *e g.*, the lakes in the Yellowstone region in the United States. Lakes formed by solution are not common and are only of local importance. They occur where the soil consists largely of soluble material which is gradually dissolved away leaving a hollow in which water collects. Where material has accumulated upon the earth's surface either by the action of glaciers or rivers, lakes are often formed by water settling in the hollows. Glaciers carry

with them large quantities of rock which when the glacier melts are left scattered irregularly over the land, which leads to the formation of large numbers of small lakes. This has happened in the case of Finland whence its name the "land of a thousand lakes" is derived. In Sweden and Scotland are numerous lakes of a similar type. The blocking of valleys by alluvial fans is another cause of the formation of lakes and sometimes a lake may be cut into two by the spread of a fan. When the floods subside on a flood plain temporary lakes frequently remain, and when a river changes its course "Ox-bow" lakes are often left in the old river bed. This is a common phenomenon in the valley of the Mississippi.

"Broads" are the lakes which result from the filling up of a river estuary. In the path of a glacier the land surface is hollowed out especially where the slope of the land suddenly diminishes and these hollows subsequently become lake basins. These are termed lakes of "erosion".

A fiord is formed where a lake basin that has been hollowed out by ice action sinks below the surface of the sea. The difference between such a valley and those formed by river action is that the bottom is *U* shaped whereas that of the latter is shaped like a *V*. In a river valley too, the tributaries flow in at water-level, but in a valley that has been cut out by ice—a fiord, the rivers pour over the cliffs in cascades. The water in a fiord is always deeper than the sea outside and near the entrance is a barrier

of rock where the glacier left its moraine matter on melting.

Drowned river valleys are termed 'rias': these are to be distinguished from fiords by having no barrier or "sill" across the entrance and the depth of water increases *towards the sea*. The bottom provides good holding for ships' anchors while the hard rock bottom of a fiord makes anchorage difficult.

In the shaping of coastlines two kinds of influences have to be borne in mind *viz*, earth movements and weather action. The sea has great erosive power. A wave twenty feet high falls with a pressure of a ton per square foot and the erosive action continues to a depth of one hundred feet below the water-level and the rapidity with which the coast will be cut away will depend largely upon the angle and nature of the rocks. If the edge of the strata are towards the sea the action will be much more rapid than if a smooth flat surface is presented to the waves. The material worn away by the sea forms a "beach" which may help to wear away the rocks more rapidly as the pebbles are continually dashed against the coast by the waves.

Smooth coastlines may be high or low according as they have been formed after or during the elevation of the land. They act as a barrier to man as the sea is shallow and there is no shelter for shipping. The smoothness of the coasts of India is one of the great natural obstacles to the economic development of the country.

G. M.—3.

Indented coastlines are due to the sinking of the land as contrasted with smooth coastlines which are the result of elevation. The river valleys become flooded and the ridges between form promontories and islands. The shape of the coast is due in the first instance to tectonic causes (earth movements) but the features are subsequently modified by weather action. The greatest amount of indentation as on the coast of Norway is produced by depression of the land followed by much glacial action. The Norwegian coast is about 1,500 miles long but to follow the line of the indentations would involve a journey of 15,000 miles. In such cases the approach to the land is difficult, but behind the islands and reefs there is good shelter for ships. Owing to the many inlets roads cannot be constructed along the coast but have to be some distance inland, so that traffic up and down the coast is carried on the sea. The population is limited to small coast towns, the land is unproductive and the climate is wet and cold. Large towns only arise where the surface of the land facilitates communication over a large area. The indentations on the coast of Greece are drowned river valleys (rias) and the great estuaries of the northern part of the United States' Atlantic coast are due to depression and drowning of the land.

As a rule the more a coast recedes from "continental shelf", *i e.*, where the sea-floor is less than one hundred fathoms down, the more indented it tends to be.

Coastlines are usually divided into two classes, *viz*, Atlantic and Pacific but the distinction is not rigid. A

coastline of the Atlantic type is sinuous rather than indented, and the islands are usually small, isolated, and often volcanic. Such a coastline cuts across the grain of the land ; the mountains are truncated, *i. e.*, run to the coast and there end abruptly. This formation is due to gigantic faults having cut across old continents, and subsequent modification by weather action. A "Pacific" coastline is generally much straighter and the mountains run parallel to the shoreline, *e. g.*, the Andes, the formation being due to folding. The Atlantic type is to be found all round Africa and Arabia, Europe, Arctic Asia, and on the Atlantic side of the American continent. The Indian coasts and those of the north, south and west of Australia, are also of this kind. "Pacific" coastlines occur on the Pacific side of the Americas, the east of Australia, around Burma and Malaya and from the head of the Persian Gulf to India.

Another type called the "Secondary Pacific" occurs on the east coast of Asia, where the sea has overrun the land and the mountain-tops appear as islands.

Islands may be continental or volcanic. The former are situated near great land masses and composed of the same kind of rocks as the mainland. Continental islands are usually situated on the continental shelf and the animals and plants resemble those of the neighbouring land ; this shows that in former times they were a part of the mainland, *e. g.*, Iceland on the Icelandic Ridge, a long tongue of the continental shelf, and Ceylon. The islands of New Zealand are also continental although the plants and animals differ

considerably from those of Australlia. This difference is accounted for by the fact that the separation from Australia took place a very long time ago ; later they were connected with New Guinea and plant and animal life reached them direct from the tropics.

Oceanic or volcanic islands have been built up by the accumulation of volcanic material and contain no *sedimentary* rocks. They are usually far from the land with deep sea in between ; often they are in groups or festoons. There is an entire absence of land animals and reptiles except toads. Islands of this type have never been connected with the mainland. They are widely spread and in many cases are of considerable importance, as coaling stations for ships and submarine cable stations, the chief "oceanic" islands in the Atlantic are the Canaries, the Cape Verde islands, St. Vincent and St Helena. In the Indian Ocean the Laccadive islands are of this kind. Such islands frequently consist largely of coral.

Three-quarters of the earth's surface is covered with water but the exploration of the formation of the ocean-floor only began with the development of the submarine telegraph. In the south of the globe is a vast ocean stretching right round the earth from which the other oceans extend, but for this the three great oceans are will separated. The Pacific and Atlantic also open into the Arctic. The Atlantic basin is long and comparatively narrow having two deep troughs running down each side ; between these is a ridge. A " deep " is an area in which the

depth of water is over 3,000 fathoms. The northern portion of this ridge is called the "Dolphin" Ridge, the southern the "Challenger"; in the extreme south it is known as the "Scotia". The seas opening from the Atlantic are fairly shallow and the connecting channels are still shallower which suggests that the formation of these seas has been due to depression of the land.

The Pacific ocean is of fairly uniform depth broken here and there by ridges and platforms. On the whole it is not so deep as the Atlantic and the floor rises steeply to the land. The deeps lie near South America or near the original Asiatic coast; one lies in the centre of the northern half of the ocean. It is only in the Pacific that there are depths of over 5,000 fathoms. The most extensive abyss on the globe, the "Tuscarora" deep is situated off the Japanese coast, and to the south of this is the "Challenger" deep of over 5,000 fathoms.

The Indian ocean resembles the Pacific somewhat in shape but is only one-third the size of the latter. It is of no great depth and includes very few deeps. From India to Madagascar runs a ridge which is a relic of the old land mass of Gondwanaland. Of the few enclosed seas the Red Sea is the chief opening over a shallow bar at Babel Mandeb.

With the exception of certain limited areas the surface rocks of the earth are covered with soil upon the nature of which depends to some extent the crops that are grown

and the other occupations of man such as mining. In nearly all cases soil is produced by the decomposition of the rocks under the influence of the weather. Usually it is thickly spread on low ground and more thinly on high ground and steep slopes. Running water and wind tend to move the soil to the lower levels. Underneath the surface is the *sub-soil* which is coarser and less porous than on the surface. Frequently it is of a yellow colour on account of the presence of iron salts. The soil and the sub-soil are continually being mixed by the action of water percolating through and earthworms bringing the latter to the surface. In addition to rock material, soil contains organic matter or "humus" derived from decayed vegetation. Local or sedimentary soil which has been formed where it is found is of the same character as the rocks underneath but in many cases where the soil has been transported by water or wind action from elsewhere the upper and lower layers are of different material. In the cool temperate regions of the northern hemisphere the sedimentary soils frequently contain a good deal of *peat* which is a plant growth that can only exist in a cool wet climate. When grass and heather grow under such conditions and the surface of the land is water-logged they gradually form a solid mass growing on the top and partially decomposed in the cold water below. Owing to the acid nature of peat it is unfavourable to the growth of plants but a peat soil can be rendered much more fertile by the addition of chalk which helps to neutralize the acidity. In damp tropical regions laterite or red earth is common. This

contains much iron but is poor in lime and other materials which plants require and is consequently difficult to cultivate until these have been artificially supplied. The best soils for general cultivation are those in which the different constituents are well mixed and contain much organic matter with neither too much nor too little moisture.

Of the drift of transported soils the chief are *Loess* and *Boulder Clay*. The former is found mainly in middle latitudes and is very rich, being especially suitable for the production of cereals. There is a broad belt in Europe extending through Poland and south Russia including the great wheat areas of central Europe ; around the Asian deserts and over vast regions in China. The wheat lands of North America owe their productivity to its presence. It exists between the glacial and sub-tropical regions and has probably been formed by the wind spreading fine moraine matter towards the south. By the growth of grasses much humus has been added to it forming *loam*. In Russia it is known as *Black Earth*. *Boulder Clay* has been formed by ice action and is common in northern Europe, Asia and Canada. Owing to the fact that it is not easily permeated by water the surface becomes water-logged and is therefore infertile except where drainage is possible. In many places it is hundred of feet thick, a relic of the ice age, having been transported by glaciers from other regions.

The most important soils are those which have been brought down by rivers *alluvial*. The exact nature

of these varies according to the nature of the rocks of the river valleys. Such soils contained a great deal of humus and are usually very previous so that water drains away rapidly. This is disadvantage in a hot climate as irrigation is necessary to maintain fertility, but the proximity of rivers give facilities for this to be done.

CHAPTER IV.

THE EARTH'S SURFACE—(*continued*).

Climate—Temperature—Humidity—Winds—Cyclone.—Monsoons—
Ocean Currents.

The weather is but a phase in a series of phenomena and it is average weather which is termed climate. As far as the geographer is concerned climatic conditions are of importance in so far as they affect man and his activities. In this connection temperature, humidity, winds, the configuration of the land and the relation between the land masses and the oceans have to be studied.

In recording temperature variations it is always the shade temperature that is taken and, in order that the average may be reliable it is necessary to take the reading every hour ; for geographical purposes the monthly or seasonal means are required. From the average of the warmest and coldest months the annual mean is obtained. To indicate temperatures on maps isotherms are used. These are lines passing through regions of equal temperature. Since however temperature varies with the altitude (a decrease of one degree Fahrenheit for every 280 feet rise) isotherms may be misleading unless care has been taken to adjust the temperatures to sea-level. In Central Asia for example the readings would be unduly high unless this correction has been made.

If the globe were uniformly covered with water the land temperatures would be entirely dependent upon the sun's heat. Now the plane of sun's orbit is at an angle of $23\frac{1}{2}$ degrees to the equator so that the limits of overhead sun are the tropics of Cancer $23\frac{1}{2}$ degrees to the north and Capricorn the same distance to the south, and except on the tropics themselves the sun is overhead twice a year between these limits. Between the latitudes north and south of $23\frac{1}{2}$ and $66\frac{1}{2}$ degrees are the temperature zones. Here the sun is never overhead nor does it ever go below the horizon for twenty four hours. The parallels of latitude $66\frac{1}{2}$ north and south are better known as the Arctic and Antarctic circles respectively. Beyond these lie the frigid zones, in which the sun is above and below the horizon each year for periods varying from twenty-four hours on the circles to six months at the poles. The movement of the earth relative to the sun brings about a seasonal swing to temperature north and south.

Temperature also is influenced by the distribution of land and water on the earth's surface and by ocean currents. Pure dry air is scarcely heated by the passage of the sun's rays but as the surface of the earth becomes heated the temperature of the lower layers of the air increases rapidly which causes the air to expand and rise. After the sun has set the earth's surface loses the heat it has received during the day and, consequently the air is cooled. The sun's rays penetrate water to a greater depth than a land so that the surface of the ocean

becomes less heated than that of the earth ; evaporation too is always going on so that for a given quality of heat the sea tends to be cooler than the land. At night the sea's surface becomes cooled. Now the cooled water being the heavier sinks to lower levels and warmer water from below rises to take its place. Owing therefore to these " convection " currents to and from the surface the cooling effect is less than in the case of the earth. Thus the sea while taking longer than the land to become heated also retains its heat for a longer period. Since the temperature of the air depends upon that of the land or water surface with which it is in contact the effect of the ocean is to keep down the temperature in summer and to increase it in winter. If a temperature map of the northern hemisphere is examined it will be noticed that the isotherms over the ocean bend to the north in January and the south in July ; in the southern hemisphere they will of course bend in the opposite directions. It is this difference in absorbing and retaining the sun's heat by land and water that brings about the different climatic conditions of coastal and inland regions distinguished by the terms " maritime " and " continental " respectively. It must be realised that it is only the air immediately above the land or water that is heated or cooled and it is only when the air moves that the temperature of adjoining area is affected, so that winds are important factors in the study of climatic conditions. Similarly warm and cold ocean currents are of importance owing to their influence on the air above them ; in the

higher latitudes they are of considerable importance to the inhabitants of coastal regions as the proximity of a warm or cold current may determine whether the harbours become ice-bound in the winter or not.

Reference has already been made to the relation between altitude and temperature. As the altitude increases radiation is lessened, the air is cleaner and drier, and the sun's rays are less absorbed on their way to the earth's surface. The pressure of the atmosphere becomes lower so that ascending air currents expand. Now as gases expand they are cooled so that the temperature of the air is reduced. Humidity is also closely connected with temperature as the capacity of the air for moisture depends upon where there it is warm or cold, and humidity and temperature combined have a great effect upon man's activities. It is the hot moist climate of many parts of the tropics that is such an obstacle to their development. At any given temperature when the water vapour in the air exerts a certain pressure upon liquids evaporation ceases and then the air is said to be "saturated". The degree of humidity will depend upon proximity to the sea, the relief of the land, and the direction of the wind. Elevation causes rainfall because the wind is cooled on being forced up over a mountain range, and when the temperature falls below a certain point the moisture in the air is precipitate. It is for this reason that clouds are commonly seen hanging over mountain tops. All heavy rainfall is due to cyclones, and therefore is, to a great extent, independent of relief. The commonest type of

rainfall in the tropics is due to convection. The air heated by contact with the land surface and containing a good deal of moisture rises, and thus becoming cooled its capacity for moisture is reduced, and the rain falls. In the case of high mountains the air loses all its moisture before reaching the summits, so that beyond a certain limit of elevation, the rainfall will diminish rather than increase.

The situation of the snow line depends upon climatic conditions as well as upon elevation. Strictly speaking there are two snow lines, one of which, usually the lower, depends upon the elevation, and the other lies along the isotherm of the average annual temperature of 32 degrees Fahrenheit. Between these limits snow will remain or not according to the relief, exposure, and the prevailing winds. The highest snow lines are on mountains in the equatorial regions. *e g*, Ruwenzori and Mount Kenia where it is 5,000 feet above sea-level. In northern Norway it is situated at between two and three thousand feet, while in the polar regions it is at sea-level.

The prevailing winds in any region are important in view of their climatic effects, and it should be noted that while ocean currents are named according to the point of the compass towards which they move, winds are known by the direction from which they come, *e. g.*, a north wind is one which blows from the north. Winds are caused by differences of pressure in the atmosphere which normally arise from the air becoming heated or cooled. A cooling of the atmosphere tends to increase

the air pressure. while as it becomes heated the pressure tends to be reduced, and the air tends to move over the surface of the earth from high to low pressure areas.

The standard by which the pressure of the atmosphere is measured is that which is exerted at sea level which is capable of supporting a column of mercury 76 millimeters in height, but since the density of liquids varies with the temperature the length of the mercury column has to be corrected by calculation according to the temperature of the air when the reading is taken. This form of barometer is the simplest to construct, but a more portable form is the "aneroid" which records the atmospheric pressure by means of a flexible metal plate whose movements are indicated by a pointer moving round on a dial. These are particularly useful for travellers in view of the small space which they occupy.

The polar regions on account of the prevalent low temperatures are areas of high pressure while in the sun tropics where the sun is overhead the pressure is low. Owing to the movements of the earth the "overhead" position of the sun varies between the limits of $23\frac{1}{2}$ degrees north and south so that the actual position of the low pressure areas varies accordingly. In the neighbourhood of the tropics of Cancer and Capricorn are high pressure areas whose exact location varies with that of the equatorial area of low pressure, and between these and the polar regions are areas of low pressure situated in the neighbourhood of the Arctic and Antarctic circles. Bearing in mind that air

moves from a region of high pressure to where the pressure is less it follows that winds may be expected to blow outwards from the poles to the Arctic and Antarctic circles, and from the tropics towards the circles and also towards the equator. Within the limits of the high and low pressure areas the movement of the air over the earth's surface will be so slight as to be practically imperceptible ; the principal movement will be vertical as the air will descend into areas of high pressure to replace that which is moving outwards and rising from areas of low pressure. These windless regions are termed " calms". This north and south trend of the winds is modified by the west to east spin of the earth so that in the northern hemisphere the north and south winds actually pass over the earth's surface in a north-easterly and south-westerly direction respectively while south of the equator the general trend is from the north west and south-east. The winds blowing towards the equator from the north-east and south-east are known as the " trade winds " ; while those from the tropics to the circles are termed " westerlies " ; the equatorial region of calms is called the " doldrums " and the term " horse latitudes " is applied to those situated in the neighbourhood of the tropics.

The trade winds pass from cool regions into warmer so that their capacity for moisture tends to increase and for this reason they have a drying effect and do not bring rain unless they are forced up to higher altitudes by intervening mountain ranges. On the other hand the

westerlies are wet winds as they are cooled as they move to the north-east and south-west.

Apart from the general distribution of atmospheric pressure local variations occur which give rise to cyclonic storms. A cyclone is a low pressure area which may be stationary or moving rapidly ; more commonly the term is applied only to those which are moving. The wind will depend upon the difference in the cyclone area and its speed will depend upon the difference in the air pressures inside and outside the area. These winds are deflected by the rotation of the earth and blow spirally, gradually filling up the low pressure area so that at length the cyclone disappears. In the northern hemisphere the wind will blow counter-clockwise and in the southern hemisphere in the opposite direction. The air in the centre of the cyclone rises and rain falls. Here there is an area of calm and the passage of a cyclone is indicated by a gradually increasing wind and the rain, then a period of calm followed by wind from the opposite direction gradually diminishing in force.

Anticyclones are local areas of high pressure which are usually stationary, resulting from a cooling of the atmosphere. They tend to be more permanent than cyclones and their area varies with the temperature. The air moves outwards and in the centre air from above descends. The winds are gentle and the presence of an anticyclone is indicated by calm cold weather. All great

land masses which become cooled in winter tend to form anticyclones above them.

The different capacities for heat of land and water are the cause of land and sea breezes which when they vary with the seasons are called " monsoons " ; these occur on the coasts of tropical and sub-tropical regions. In India the climate is essentially of the monsoon type. Here for practically half the year the wind blows from the land, while for the rest of the time the prevailing winds are from the south-west. It is this south-west wind that brings rain to the borders of the peninsula where it is forced to rise by the Ghats. Passing beyond they strike the great mountain barrier of the Himalayas on the southern borders of which they deposit the rest of their moisture. The inrush of rain bearing wind is due to the heating of the land in northern India and the Indus valley. Further east in the Malay peninsula, southern China and southern Japan monsoon conditions also prevail but as we proceed eastwards the wet wind comes from the south rather than from the south-west, until in Japan it is definitely south wind. In the winter season in India when the north-east monsoon prevails the weather is dry and comparatively cool but a certain amount of rain falls on the south-east coast as wind takes up moisture in passing over the Bay of Bengal.

During the months of July and August wet winds from the Mexican Gulf blow in to the Mississippi valley, and for a similar period in mid-winter dry winds blow southwards from the south part of the river valley. On the

northern Australian coast there is a similar short period monsoon. Here however it is in December and January that the wet winds occur. The heating of the Sahara desert gives rise to inshore winds in the west Coast region but little moisture is deposited owing to the land being heated and the absence of mountains. This occurs during the months of August, September, October and November but there is no corresponding period of off-shore winds.

“Fohn” winds are local warm dry winds which blow from high to low altitudes. The air is warmed by compression as it descends. These are purely local and occur mainly in the Alps, British Columbia and Greenland. The “chinook” wind of British Columbia is of the same type and originates by winds from the Pacific blowing through the mountain passes. As it melts and evaporates the snow in its track it is of considerable importance to the cattle-rauchers. In the Mediterranean a similar phenomena is to be found in the “sirocco” which however differs from the others in being a wet wind.

It is the modifying effect of altitude upon climate which makes possible for Europeans to live on the plateau of East Africa and accounts for the development of the Himalayan hill-stations in India. For similar reasons the chief cities of Mexico in ancient and modern times have been situated in the highlands of the interior. In the temperate regions the reverse is the case and the severities of the climate in highland areas tend to check

rather than promote human progress. The population in Switzerland is practically limited to the valleys and in Scandinavia the bulk of the people are to be found in the less elevated lands fringing the Baltic on the east and south.

In maritime regions there is usually a good deal of rain which falls mainly in the winter months. The sky is frequently obscured by clouds and the relative humidity is high. A continental climate is characterised by extremes of temperature at different times of the year, and a dry dusty atmosphere with comparatively little rain which falls mostly in the summer. The pressure variations which are caused by the extremes of temperature may, where other conditions allow, produce monsoon effects. The climate of desert regions, *i.e.*, where the annual rainfall does not exceed ten inches, an extreme type of continental climate is found.

Just as in the atmosphere there are air currents moving with varying intensity in various directions so in the ocean there are currents of water. The term current is limited to those having a well defined rapid movement, and others, of slower movement and less definitely formed, are known as "drifts".*

* "Currents and wind systems of the oceans modify the climate of the nearby continents, and direct the first daring navigations of their peoples. The alternating monsoons of the Indian ocean guided Arab merchantmen in ancient times back and forth between the Red Sea and the Malabar coast of India. The equatorial current and north-east trade wind carried the timid ships of Columbus across the Atlantic...."
Semple : Influences of Geographic Environment.

The best known of these currents in the Gulf Stream which is caused by the heaping up of the water in the Gulf of Mexico. From here it flows out round the coast of Florida. The configuration of the land forces the current to the north-east where it comes into the path of the westerly winds blowing over the north Atlantic, which carry the surface waters towards the European coast as the Gulf Stream Drift. Off the Newfoundland coast the Gulf Stream meets a cold current which flows southwards from Davis Strait which has the effect of bringing the former to an end. The Gulf Stream itself never reaches the coasts of Britain. It is the clashing of these warm and cold currents that produces the fogs, which are so troublesome to shipping near the North American coast. On approaching the European coast the Gulf Stream Drift divides into two parts one of which flows southwards past the coast of Portugal while the other goes to the north towards the coast of Norway and owing to its influence the Norwegian harbours remain ice-free in the winter. The cold current from Davis Strait brings vast quantities of microscopic plant food to the Newfoundland banks upon which fish feed and this renders the banks so valuable as a fishing ground.

In the Pacific ocean there is similarly a warm current, the Kuro Siwo, which flows to the north-east from which a drift is carried eastwards.

There are two equatorial currents which flow towards the equator from north and south and in the southern hemisphere is a westerly drift which circulates rapidly round the world.

CHAPTER VI.

THE EARTH'S SURFACE—(*continued*).

Vegetation*—Deciduous, Evergreen and Coniferous Forests—Forest industries.

There are two main types of vegetation, *viz.*, woodland and grassland, both of which are to be found in the same latitudes the presence of either being dependent upon climatic conditions. There is of course no abrupt transition but one gradually merges into the other. Woodland varies from the dense forests of the tropics to the open forests bordering the arctic regions, and grasslands include the richest meadow lands and the semi-barren tundra areas. Deserts are regions destitute of vegetation of either type owing to too great a lack of moisture or extreme cold.

A plant derives the moisture it requires from the soil by means of its roots and a great part of its food is absorbed from the air through the leaves. For healthy growth a plant must have moisture, air, and light. Temperature is less important a matter and plants can grow in parts of the Sudan subjected to a temperature of

* " It is only indirectly through the food-supply that the numbers and modes of life of the inhabitants of any region are regulated by climate. The intermediate agent is vegetation."—*Dickson : Climate and Weather.*

100 degrees F., while others live under arctic conditions with the temperature descending to 100 degrees below freezing. Trees are capable of withstanding a much greater degree of drought as their longer roots reach well down into the sub-soil so that although the surface of the ground may be dry or frozen the tree is still able to secure the necessary moisture. Among grasses too it is those varieties which have the longest roots which are best able to withstand climatic variations.

A good deal of the moisture of a plant is exuded through the leaves, and if the evaporation is excessive owing to the dryness of the atmosphere the plant may die. Trees are more sensitive in this respect than grasses owing to their leaves offering a greater surface to the atmosphere and their reaching to a much greater height above the ground and they cannot grow where dry winds and hard frosts are prevalent as the deeply frozen ground prevents the roots from absorbing sufficient moisture to cope with the evaporation. The northern limit of tree growth is thus determined by the fact that north of a certain latitude dry winds blow during a prolonged period of hard frost. The most favourable climate for promoting tree growth is one in which the subsoil is always moist and the air is damp and relatively calm.

Grasses have short roots so that they are far more susceptible to drought, but as the air close to the surface of the ground is damp, if the soil is at all moist they can grow where it would be impossible for trees to exist. For

a part of the year grasses cease growing and lack of moisture during this period is not a serious matter provided that there is sufficient in the season of growth. Cold dry winds have little effect upon grasses owing to the small surface which is exposed to the air.

Between the poles and the equator the distribution of vegetation is roughly as follows : cold deserts, poor grassland, *i.e.*, tundra, forest, grassland, hot deserts, grassland, and the equatorial forests.

In the regions having no definite dry season are to be found the tropical forests, in the river valleys near the equator, *e.g.*, the Congo, Niger and Amazon basins, New Guinea, Borneo, Burma, the Malay States and in the east of Bengal. Here the vegetation is very dense, consisting of high trees surrounded by a mass of impenetrable undergrowth, and the trees are festooned by innumerable lianas and creepers. The ground surface is covered by decayed vegetation and fallen trees. Where there is a definitely dry season as in the monsoon areas the forests are thinner and can be traversed with comparative ease. Beyond the tropical forests are the savannas, which consist of rich grasslands with scattered trees as in Sudan, the more elevated parts of Brazil and bordering the Australian tropical forest region. There are few obstacles to travel and an abundance of food for cattle so that such regions offer good facilities for human development.

The woodlands of the temperate zones differ from those of the tropics in producing far fewer species of trees ; there is far less undergrowth and on the ground but little decayed matter or fallen vegetation, consequently few obstacles are offered to penetration. The trees of these temperate woodlands are of three types each of which is peculiarly suited to the climatic conditions which prevail in different latitudes and at various altitudes. In the Mediterranean region the rain falls mainly in the winter and the summer are dry and hot, but the trees are of the "evergreen" type such as the evergreen oak, the olive and the laurel. These have large, thick, leathery leaves whose surface is covered with a wax-like substance which checks evaporation so that they can manage to live through the hot dry season. This type is to be found also in South Australia and California where the climate is similar. Further north where rain falls in all seasons and dry winds occur only in the winter the non-growing period are the deciduous trees such as the oak, ash, elm and beech. In the autumn, at the end of the growing period their leaves fall off so that in the cold weather the evaporation surface is very greatly reduced, and with the return of warmer weather, in the spring, a new crop of leaves appears. The third type, coniferous, is found in still higher latitudes where there is a good deal of rain and strong winds are prevalent. In order to withstand the effect of the latter leaves of this type are needle-shaped so that a small surface, only is presented to the drying effect of the air.

The climatic conditions which favour the development of trees of the evergreen type is inimical to the growth of grass and the cultivation of the soil. In these regions citrus fruits (in great demand for export), olives, (valuable for their oil), and cork are the most useful natural products. The acorns of the oak forests are used to feed large herds of swine. Owing to the scarcity of herbage and the prevalence of coarse, prickly, leaved plants the characteristic domestic animals are the ass, goat and mule which are capable of extracting nourishment from such unattractive vegetation.

A great part of the regions formerly covered by deciduous forests has been converted into arable land as the normal conditions here are suitable for the growth of cereals. Thus the deciduous forests have given place to agricultural settlements, and there is no particular type of economic development to be noticed as far as this type of woodland is concerned.

The coniferous forests are situated in regions that are unfavourable to agriculture and remote from the great centres of population. Their value lies in the production of wood that is soft and easily worked, and although there has been an enormous amount of destruction there are still vast areas yet to be exploited.

Until the coming of civilised man the coniferous forest regions were but very scantily populated. The inhabitants have the choice of two methods of making a living, *i.e.*, by the exploitation of the timber, or by hunting and trapping the fur-bearing animals which find a home here.

Both of these occupations arise from the demands of the people in other lands. Furs, curiously enough, are commonly worn in those regions in which they are not really demanded by the climatic conditions ; this is essentially a luxury trade. At an early stage in the civilisation of Western Europe the demand for furs was the cause of hunters penetrating the forest regions. These were not primitive hunters but rather people of peasant ancestry reverting to a primitive occupation.

In Canada trading stations arose on the edge of the forests and along the rivers, and these " forts " formed the earlier of the principal towns of Canada and along the Pacific coast of the United States. As the demand for furs increased the trappers pushed northward and were the first explorers of the Canadian Arctic regions. Alaska became Russian territory because of the migrations of trappers from Siberia across Behring Strait into Canada, and subsequently it was purchased by the United States.

The exploitation of the coniferous forest timber was a later development. Lumbering as this is termed, includes various processes which are best carried on at different seasons of the year. The snows of winter make good slides for the conveyance of the logs to the river banks, while as the rivers thaw and come down in flood in the spring they can easily carry down the logs to the saw-mills and seaports. It is impossible to produce timber on a paying basis unless such cheap water transport is available ; timber will not bear the cost of land journeys.

For this reason the Siberian forests are as yet hardly touched as they are too far from waterways. Here rivers are frozen for eight months in the year and the route to sea is very long.

Lumbering produces a form of nomadism. For example in Canada the men go to work in the forest in the winter, when agriculture is at a standstill, and in the spring return to carry on the cultivation of the land.

Fur trapping and lumbering are not primitive occupations. There must be adequate facilities for the transport of food and some additional means of subsistence, since they are both occupations which are only carried on during the winter months. Saw-mills and shipbuilding depend on the activities of the lumbermen, and the big demand for cheap paper has led to the utilisation of wood-pulp in paper manufacture. At first the pulp was exported but a later development is the manufacture of paper in the vicinity of the supplies of timber. Coniferous forests, since they are generally near rivers and waterfalls, usually are provided with ready means of transport and the production of the necessary power for manufacturing processes.

Paper at first was manufactured from various vegetable fibres, *e.g.*, esparto grass; but the enormous increase in demand during the latter half of the nineteenth century led to the use of the fibres of the wood of coniferous trees and the wood-pulp industry brought a wave of prosperity to the coniferous forest regions. Newfoundland could not compete with Scandinavia as regards the timber trade but wood-pulp being so much more easily transported

enabled Newfoundland to supply the European markets. Since in the coniferous forest lands there are abundant supplies of water-power that can readily be utilised in pulp manufacture, the new commodity proves far more profitable to export than the original timber. Finland and parts of Scandinavia have gone a step further and are now exporting coarse varieties of paper. The finest paper is made from rags while the coarser grasses and straw can be made into cardboard. It is the regions which produce the raw materials that are benefiting the most by the development of the paper industry.

The exploitation of the forests is a robber economy and may adversely affect the future prospects of the countries concerned as it reduces the possibilities of overseas trade. A common fallacy is that the rainfall of the region is reduced as the trees disappear ; for this belief there is no foundation whatever. Because the soil is laid bare evaporation increases, and moisture disappears the more rapidly ; on a wooded hill tide the water trickles gently down into the valleys, but if the surface is bare the valleys are liable to be flooded as there is nothing to check the rush of the water from the hills above. *In this way only can the climate be affected **

* " With the hills long since denuded of trees and brushwood ...the question of fuel in China is vital. Grass, rice-straw, cotton stems are used for this purpose, but for construction work and boat-building, various kinds of foreign wood are imported to supplement the meagre native supply."—*National Geographical Magazine, Vol. LI, No. 46.*

CHAPTER VI

DISTRIBUTION OF POPULATION.

Factors leading to concentration of population—Defensive sites—Centres of trade and commerce.

The geographical factors that influence the distribution of population on the earth's surface are relief and climate and their effects upon the production of food. In the eastern part of the Ganges valley the population is over 400 to the square mile while in the lands of the north-west mountain region it is about 150. Here the rainfall is far less and cultivation is restricted to the river valleys where irrigation is possible. The Thar desert, arid and infertile, only supports a very small nomad population.

The world is by no means fully populated but some countries are so densely peopled that their own food resources are not sufficient so that the population is largely dependent upon food-stuffs brought from other regions by the aid of long distance transport. Such a condition of affairs arises owing to the occurrence and exploitation of minerals, and where this has led to the development of manufactures the growth of population has usually been very rapid. Its density in such localities will depend upon the possibilities of importing food from other regions in which a surplus of

food is being produced.* The development of new countries has thus been largely due to industrial development elsewhere. England's industrial progress gave a great impetus to the growth of dairy farming in Denmark as well as to the opening up of the great wheat lands of the new world.

Centres of population, *e.g.*, villages and towns, arise because of certain factors which tend to make people settle in those particular places. In the beginning where two or more roads meet or cross an inn may be established where travellers can rest, and possibly a blacksmith's shop where vehicles can be repaired and horses and oxen can be shod. Then, to supply local needs minor industries develop in which are used such raw materials as can be found in the neighbourhood.

There are certain natural features which cause a focussing of routes on a particular spot as for instance a place where a river, elsewhere impassable, can be forded, an area of firm ground in an otherwise marshy region, or a pass through a mountain barrier. Glasgow, Chester

* " Hundreds of thousands of live cattle, and many hundreds of thousands of tons of meat have to be imported into the country (the United Kingdom) every year...even the home supply of eggs, butter and cheese has to be supplemented from abroad, while tea, coffee, cocoa and sugar are supplied from each of the four great continents. For these articles of daily existence alone Great Britain has to pay £205,000,000... .. and if she were cut off from the outside world for even a few days every household would feel the sudden rise in price."—*Palgrave : Dict. of Political Economy, Art : Commercial Geography.*

and York owe their origin to river fords and Hyderabad (Sind) and Strasburg are situated upon patches of firm ground in swampy areas, while the towns of the north-western frontier of India owe their importance to the centering of routes between India and western Asia on the passes through the mountains.

Other instances of towns which have originated on account of a convergence of routes are :—St. Louis at the junction of Mississippi and Missouri, formerly a great depot for river traffic and now an important centre of land routes. The traffic from the great Lakes is transferred to the Mississippi *via* Chicago and here the east and west routes of the United States have to bend southwards to avoid lake Michigan. This has led to the growth of Chicago. The Blue Nile and the White Nile meet at Khartoum, while Belgrade is at the union of the rivers Danube and Save. At the eastern and western ends of the Pyrenees, on the routes between France and Spain are Perpignan and Bayonne, while Vienna is the focus of routes to east, west, north and south. A converging of routes at points on the edge of a desert will also cause centres of population to develop as in the case of Damascus and Timbuctoo.

In connection with the origin of ports other factors have to be taken into account, and it must be remembered that most ports originated in the days when the only means of sea-transport was the sailing-ship. Sailing-ships require adequate protection from winds, fairly shallow

water for anchorage, and a sea-bottom of such a nature that anchors can hold, *e.g.*, mud or sand. But however favourable may be the conditions of the coast, ports will not develop unless the hinterland, *i.e.*, the land behind the coast, is productive and well populated. This is of less importance in these days as the railways can bring goods from considerable distances inland. The further ships can go into the land the better for commerce, as the area that can be served by "inland" port is greater than that having ready access only to one on the coast. Modern day transport facilities however help to equalise the advantages of ports in this respect. River estuaries thus provide facilities for the growth of ports, but with the great increase in the size of ships ports, which have developed up river mouths are liable to be superseded by others nearer the sea, on account of the depth of water required. These newer ports are known as "outports". Paris for instance has two outports, Le Havre at the river mouth at which the largest vessels call, and Rouen further up the Seine which smaller vessels can reach, while yet smaller ships are able to reach Paris itself. Other examples are Avonmouth for Bristol, Cuxhaven for Hamburg, Greenock for Glasgow, and Tilbury for London. Buenos Aires arose largely on account of the adjoining wheat producing areas, but much difficulty was for long experienced as owing to the shallowness of the water large vessels had to anchor fifteen miles off the shore. This led to the development of La Plata but even

tually a channel was constructed so that La Plata diminished in importance. Buenos Aires was the more favourably situated as goods had to be conveyed a longer distance on land, and land transport is relatively costly, for shipment at La Plata. The closing of an estuary by ice during a part of the year may also promote the development of outports. During summer months the cross-Atlantic steamers go up the St. Lawrence estuary to Montreal, but in winter, when the estuary is frozen, passengers and goods are landed at Halifax and St. John whence they are sent inland by rail.

So far we have been considering the cases of where the movements of people and goods have given rise to towns, which may thus be termed centres of movement. Another type is that of towns which have developed as centres of settlement.

These are generally associated with the exploitation of mineral resources and the progress of manufacturing processes. Frequently it has happened that a town which originated as a centre of movement has subsequently developed as a centre of settlement. Towns situated on coal-fields rarely owe their origin to the coal fields. They have more usually been villages or small market towns which have later developed on a much larger scale owing to the proximity of coal-mines. The presence of raw materials, *e.g.*, wool, may help, and, as time goes on, and the industry increases, it becomes necessary to import additional supplies of raw materials, the town becomes a centre for the collection and distribution of the raw materials and the

finished goods. For the development of industry an adequate supply of labour must be available and for this reason so many important industrial towns have arisen in the populous centres of the world. In fact the presence or absence of labour may be a deciding factor. Ipswich in Suffolk, on the east coast of England, has large iron works for the manufacture of agricultural machinery, but there is neither coal nor iron in the neighbourhood. Being close to the coast at the head of a river estuary, the Orwell, these can be brought from the mineral areas cheaply by ship. The industry owes its origin here to the fact that adequate supplies of cheap labour were available. Facilities for obtaining raw materials are important, and the location of the English cotton goods industry in Lancashire has been largely because Lancashire is nearer than Yorkshire to the source of the cotton in America, although the people of both countries were equally skilled in textile manufactures owing to the long established woollen industry. The Lancashire cotton industry illustrates another point in connection with industrial developments, and that is the effect of climatic conditions. When cotton fibre is being spun if the atmosphere is too dry the fibre is liable to snap which makes the process difficult. Owing to the wet winds from the Atlantic being checked in their movement across the north of England by the Pennine Chain, Yorkshire, on the east has a drier climate than Lancashire on the west. The moister climate of the latter thus is preferable for cotton manufacture,

so that Yorkshire continues as a great centre of the woollen industry, while cotton industry flourishes in Lancashire. In the absence of coal the existence of water-power may give rise to industrial centres as in the case of the manufacturing towns of the "Fall line" in the New England States in America, and at Foyers in the Scottish highlands the extraction of aluminium is carried on by means of power derived from mountain streams.

The jute industry of Dundee exemplifies the effect of the presence of raw materials on the development of manufactures. Originally the main industry of this region was the making of linen from flax which could be grown locally. As the industry expanded local supplies were insufficient, and flax had to be imported from the Baltic lands of northern Europe. With the outbreak of war between England and Russia these supplies were cut off, but the people had acquired the requisite ability for textile manufacture, and as jute could be obtained from India, every facility was available for its use; so, when supplies of flax failed the textile industry of Dundee was devoted to the manufacture of jute.

Sheffield, the great centre of iron and steel manufactures in Yorkshire, is a meeting place of fertile river valleys, surrounded by hills. Formerly it was a market town in which were sold the products of the neighbouring valleys. The rivers flowing down the steep hillsides provide an abundance of water-power and the hills formerly contained large quantities of iron ore. Consequently as there was

an abundance of raw material at hand, and the rivers provided plenty of power for grinding, the cutlery industry developed. In addition to the iron a further advantage was that in the hills were also plentiful supplies of a particularly hard kind of stone, known as " millstone grit " which was particularly suitable for making the grindstones. Now-a-days the power is provided mainly by steam but there are still a few of the water-power mills at work.

The transport of coal is generally costly more than that of raw materials so that modern industrial centres are usually situated on or near coal-fields, and the various raw materials are brought there. This is not invariably so, as shown by the case of Beawar, a centre of textile manufacture in Rajputana. The coal used in the mills is transported all the way from the Jherria mines in Bengal but the disadvantage of this is outweighed by the fact that abundant local supplies of wool are available, labour is cheap, as is also land for building purposes. The cost of building is also low as the Aravalli Hills close at hand provide plenty of good quality, durable stone. Transport charges which depend on the situation of an industrial centre relative to the markets for its goods may influence the nature of the goods produced. Middlesbrough on the north-east coast of England manufactures heavy iron and steel goods such as girders and the like whereas Birmingham, also noted for iron and steel goods, produces mainly articles which are small in proportion to their cost.

A hill overlooking a pass has often provided a site for a town on account of it being easily defended and giving control of the traffic going through the pass. This is the case with Edinburgh and similarly Gibraltar is of importance as it controls the strait (a "water-pass") leading from the Atlantic to the Mediterranean. For the same reasons—safety—towns have grown up on islands as for instance Hong-Kong and Zanzibar. To-day such positions are less easily protected and the separation from the mainland is a disadvantage commercially; in Bombay this has been overcome by the construction of bridges to the shore.

The construction of railways has also brought about the development of towns where the constructional and repairing shops have been erected. Swindon, originally but a small market town in Wiltshire, has grown enormously owing to the fact that it was selected by the Great Western Railway as the site of their works. Gorakhpur and Ajmere similarly owe a good deal of their progress to the Bengal, North-Western and the Bombay, Baroda and Central India railways respectively. Some towns have arisen on sacred spots as for example Benares, Mecca, Muttra and Hardwar, while other centres of population owe their existence to climatic conditions, such as the hill stations in the Himalayas, *e.g.*, Simla, Mussoorie and Darjeeling.

Trade and commerce have also been responsible for the origin of towns. The peasants in Europe in bygone days would meet at the mouths of the valleys for the

purpose of bartering their produce and the towns thus begun have developed owing to other influences. The unequal distribution of commodities tends to the development of trade and barter between primitive and more civilised communities and leads to the progress of the former, the first stage being a realisation of value. When first the white men began to trade with the negroes of West Africa in the days of the "Great Triangle", slaves, ivory, and other things were sold readily for beads, cheap bright coloured cloths and similar showy, shoddy, articles, but as time went on commerce took on a less one-sided aspect. The Eskimo too, will, now, no longer part with valuable seal-skins and the like for cheap looking glasses.

The development of trade leads to the development of the means of transport. The most primitive means of conveying goods from one place to another is human beings, and subsequently on the backs of animals. In certain regions to-day where other means of transport do not exist these methods are still employed. In the Himalayas a great deal of carrying is done by coolies, and sheep and goats laden with goods are commonly seen. It is thus the nomad races, shepherds and herdsmen who are responsible for the earlier stages of long distance, overland, transport. Such trade is of necessity confined to goods whose value is large relatively to their bulk and weight, and in the main comprises luxury articles, *e.g.*, precious metals, jewels, perfumes and feathers. The earliest long distance

trade appears to have been developed by the Arabs, and as long ago as 800 B. C. amber from the coasts of the Baltic lands was long carried into Syria, and some two thousand years ago Chinese silks were sent to the Mediterranean. It would however be wrong to assume that in such cases the goods were conveyed direct to their destination, from the place of origin. What probably happened was that en route they were repeatedly bartered and passed from one set of traders to another. Before the Christian era the Arabs had penetrated far into Africa in search of slaves, and the slave caravans provided a cheap means of transport for all kinds of commodities between the interior and the coast.

Just as overland trade originated with nomad races so sea-borne trade first developed among those peoples who were nomads of the seas, *e.g.*, the Phœnicians and Greeks. They undertook, for those days, long voyages in search of wealth. As they proceeded on their voyages they developed trading stations in suitable places such as Carthage. They procured tin from the British islands and traded also with West Africa. The isthmus of Suez was then not cut by the canal and, marvellous to relate, in those far off days vessels were taken over the isthmus and voyages were made circumnavigating the African continent. These peoples, the Phœnicians and Greeks, and, later the Norwegians, and British, were tempered to take to the sea on account of the nature of their homelands and so each in turn became famous as sea-traders. In the

middle ages the Genoese and Venetians traded with the ports at the eastern end of the Mediterranean, where the Arabs and Mongol caravan routes from the interior of Africa and China terminated. In the fifteenth century the Turks took possession of the regions to the east of the Mediterranean and thus the possibilities of trade between Europe and the east came to an end. Consequently efforts were made to find a fresh route to India and China, and the Portuguese, Vasco de Gama discovered the sea-route *via* the Cape of Good Hope. This led to the development of Capetown as a port where ships could refit and revictual. In the course of time the importance of the trade between the east and the west led to the cutting of the Suez Canal. This in turn checked the development of Capetown as ships for India and China no longer followed the Cape route, and a further result was that Calcutta was put at a disadvantage in comparison with Bombay as a port for European trade.

The goods sent to Europe from the east in the middle ages consisted principally of spices, silks, dyes and perfumes and it is interesting to note that the East India Company was originally established on account of the great demand in Europe for pepper. With the gradual increase in the size of ships and increased safety of sea-voyaging these commodities became cheaper and at length tea, tobacco and the like became no longer luxuries but conventional necessities within the purchasing power of the bulk of the people of western countries. As western

Europe became industrialised the trade in raw materials—goods that are bulky in proportion to their value—developed on a large scale but this could not happen until overseas trading had become firmly established, and the discovery of new countries brought to light new kinds of raw materials. The use of coal in industry developed a demand for mineral ores and in quite recent times the development of the motor vehicle has brought about an enormous demand for rubber. Following the growth of trade in raw materials there came trade in manufactured goods and the history of tropical and colonial lands in the nineteenth century is in the main a record of competition among western nations for raw materials in the first place and secondly for markets for the products of their industries.

The last type of trade to develop is that in foodstuffs between old and new countries. This only develops when in certain countries the population has outgrown the local food resources. Trading in luxury articles still continues but the chief items in the world's commerce to-day are raw materials and food. The former are carried principally from tropical regions to industrial centres as they are usually vegetable products that cannot be produced in temperate climates, the chief exceptions being cotton and mineral ores, and foodstuffs come generally from temperate regions *viz* the tropics—a great proportion of England's food for instance comes from the lands of the southern hemisphere.

CHAPTER VII.

DISTRIBUTION OF POPULATION—(*continued*).

Influence of transport facilities—Agricultural and industrial areas—the five continents.

As has been mentioned the earliest means of transport were man himself and pack-animals. Had it not been for the camel trade in the Sahara desert region would have been impossible, and it has been introduced with a good deal of success into the more arid regions of Australia. A further development was the employment of wheeled carts, the use of which directed attention to the making of roads. It is surprising to notice how recent an art is road construction. The Romans made excellent roads, which here and there in western Europe still exist, but for centuries after Rome's power had decayed the art seems to have been lost, and was only revived about a century ago by Macadam, Metcalfe and others.

Railways originated in connection with coal-mining and rapidly developed into a dominant feature in transport with the invention of the steam-engine. Not only has the railway been a great asset in temperate countries but it has made possible the opening up of tropical regions whose development had hitherto been impossible. Railway trains are unaffected by tropical diseases and the bites and stings of noxious insects, so that where transport

had formerly been a matter of the greatest difficulty and expense, owing to the animals sickening and dying from disease, railway construction proved an early means of overcoming these obstacles. In the valley of the great rivers of Africa where falls and rapids bar the passage of boats, short railways have in many cases been built to convey goods between the different navigable reaches, so that the loss of time and the increased charges involved by manual portage have been avoided.

Thanks to the comparatively recent development of long-distance transmission of electrical power, the application of electricity to railways and its use for working automatic safety and signalling devices, is doing a great deal to simplify the complexities of railway transport. Like the steam-engine, the electric locomotive is immune from the attacks of disease, insect-pests and the like ; its operation is simpler, and the need for constant renewal of fuel and water is obviated.

A recent development that may greatly increase facilities for land transport, especially where the nature of the country is such as to make the construction of roads and railways difficult, is the substitution of tracks—bands of hinged iron plates, for wheels on land vehicles. This enables a vehicle to travel easily and fairly rapidly over the roughest ground where ordinary wheeled vehicles would be entirely useless.

The effect of motor transport upon railways is as yet an open question. In the United Kingdom, despite

the post-war system of grouping, railway receipts during recent years have diminished to an alarming extent. This is doubtless due partly to the competition of the motor lorry and omnibus but the issues are not altogether clear as other factors such as over-capitalisation, general economic depression, national and international, need to be taken into account. Motor traffic has certain outstanding advantages. The roads are maintained by public funds and although special taxes are imposed upon motor users, the charges they have to bear are in no way to be compared in magnitude with the cost to a railway company of maintaining its permanent way. Also, as no special track is needed, the motor lorry has a greater degree of mobility than the goods train. Business firms in large centres are able to send goods rapidly to the doors of their customers in remote country villages, and the delay consequent upon sending the goods to the station, putting them on the train, unloading at the far end, and despatching to their destination, is completely avoided. In the case of bulky goods, and where rapidity of delivery is not of primary importance, the goods train still can hold its own, as the capacity of a motor lorry even with a trailer is limited, and a complete power unit is required for a much smaller freight than in the case of railway transport. As yet there appears little probability of the railway being entirely superseded, but nevertheless, for commodities of limited weight and bulk, especially where rapidity of delivery is important, the motor vehicle seems to be the more disadvantageous.

As far as passenger traffic is concerned, in advanced communities the railways have undoubtedly suffered from the competition of the motor car and omnibus. For comparatively short journeys, especially where a margin of time can be given, road journeys offer many attraction ; but for long distances, and where punctuality is of prime importance, the express train with its almost unfailing regularity and the amenities it can provide for the comfort of its passengers is as yet unsurpassed. One can hardly imagine people residing in India, and proceeding on leave to England travelling from Marseilles to Calais by road in preference to going by train.

Sea transport was revolutionised by the coming of the steamship which has the advantage of being able to proceed from place to place regardless of the winds. The early voyages to India *via* the Cape of Good Hope and Zanzibar sailed from Zanzibar to the Indian coast in the season of the South-west monsoon but could not return until the North-east monsoon had set in. To-day, thanks to the steamship and motorship passengers and goods are conveyed to and from India with the greatest regularity at all times of the year. But with all their disadvantages sailing ships are very economical, and when time is no object they can still be profitably employed, *e. g.*, for the coastwise conveyance of building stone and timber. Steam and motor ships are especially useful for the conveyance of perishable goods in which rapidity of transport is of primary importance. Coal is being

rapidly superseded by oil as a fuel for ships. It takes up less space on board, is more easily loaded and a good deal less labour is required in the stokehold. It is not however so easy to convey in bulk and store at the supply depots.

As compared with land transport, sea transport is far cheaper* but slower—the average merchant ship travels at about ten or eleven knots† an hour. To convey grain from America to Rouen costs less than to send it by rail from Rouen to Paris. Again, although the Pacific Ocean is considerably broader than the Atlantic, Japan can compete successfully with Europe for wheat from Alberta, as the land route from the wheat areas to the west coast ports of Canada is shorter than to the east. The great source of expense with regard to both land and water transport is the cost of loading and unloading. This has led to the invention of all sorts of devices to cut down the time occupied and the amount of labour that has to be employed. To load grain for instance it is lifted mechanically to a certain height above the ship and then poured down chutes into the hold of the vessel. The train ferry is another means by which undue handling of cargo is avoided. This

* Ore can be carried from Algiers to west Hartlepool a distance of 1,900 miles for 6/6 per ton.....while from West Hartlepool to Leeds, a distance of 65 miles, the railway rate is 6/5. *G. Cadbury : Address to Congress of the Institute of Transport, Birmingham, May 1927.*

† About 1·2 miles.

is a large ship whose wide decks are covered with sets of railway lines - usually four side by side. In harbour these are connected by a specially designed bridge with the ordinary railway tracks. The trains of waggons are shunted on to the vessel by which they are carried across the sea to a foreign port. Here an engine pulls them on to the land railways, and the train can proceed to its destination in the ordinary way. In this manner the unloading of the goods from the train to the ship and subsequently from the ship to the train is obviated. Such ferries travel between Harwich in England and Holland, and are also employed for the traffic between the Jutland peninsula and the various islands of Denmark in the Baltic Sea.

The increase in the size of ships and the substitution of iron and steel for wood in their construction has had considerable influence upon the location of the shipbuilding industry and upon the prosperity of various ports at which it has been carried on. Wooden ships were naturally built in proximity to supplies of timber and as these became exhausted the industry tended to decline. Large ships require a big launching space and where this has not been available the industry has been adversely affected. Until comparatively recently a great deal of shipbuilding was carried on in the Thames Estuary but it has practically ceased as the space available is not sufficient for the launching of vessels of the size now in demand. As the supply of raw materials or fuel becomes exhausted industries frequently migrate to other places where supplies can

be obtained. Before the development of coal-mining in England the iron industry was located in Sussex and Kent where there were supplies of iron ore and where the Wealden forest provided the wood needed to prepare the charcoal used in the smelting process. After a time the supplies of wood were exhausted and the iron industry of south eastern England migrated to the midlands and the north where iron and coal were to be found in ample quantities.

While in an industrial region the population tends to be massed together in the towns, agriculturists are scattered more evenly over the surface of the country as a result of the nature of their occupation. The density of the population in the latter case varies with the nature of the crops that are grown and the quantity that can be produced on any given area. Despite the fact that certain tropical crops such as the banana and bread-fruit are capable of supporting large numbers of people, population in the tropics rarely expands to its possible limits, as the negro does not engage in intensive cultivation. When it has been developed upon a large scale it is to provide food for export to temperate lands.

It is the industrial areas in which the densest populations are to be found such as in the north and midlands of England, *e.g.*, the West Riding of Yorkshire which has about three thousand people to the square mile, the Clyde basin in Scotland, Belgium, and Germany. In the lowlands of Holland there is a dense population but this is purely agricultural. It is interesting to note that since mountain regions are usually sparsely populated there is a close

connection in certain countries between the geographical relief and the distribution of the people. In other cases, where the surface of the country is generally rather flat, as in Russia there is a similar connection between the density of the population and the distribution of vegetation.

Compared with Europe, Asia is far more thinly populated except in the alluvial river valleys of the monsoon lands such as the Hoang-Ho, the Ganges and in the islands of Japan. The population of Java is far more dense than that of other East Indian islands on account of the improved methods of cultivation introduced by the Dutch, who are specially skilled in intensive agricultural production. Owing to the density of the tropical forests the population of the Malay States is very meagre.

Africa includes a whole variety of regions of vegetation, forests, rich and poor grasslands, and deserts. The densest population is to be found in the Nile valley, while the basins of the Niger and Congo, and the grasslands stretching from West Africa to the Soudan are also fairly thickly peopled. The population on the West Coast is accounted for by the trading centres that have long been important in this region. In the south the population is centred mainly in the east, but in the extreme south a belt of fairly dense population stretches across Cape Colony to the west coast.

In the American continent a great deal of Canada is uninhabitable, so that here the population is relatively

small except in the valley of the St. Lawrence river, and the densest population of the United States is to be found in the east, especially in the north.

Two factors operate regarding the distribution of the people in Mexico. Here most of the population is located on the high central plateau region, because on account of the elevation, the climate is healthier than on the coast, and here also occur valuable mineral deposits. A similar distribution occurs in Central America for climatic reasons.

The population of South America is to be found mainly along the coasts and in the temperature regions. Except on the highlands of Sao Paulo (where there are settlements of Swiss and German coffee planters), Brazil is thinly peopled as there are few ports, and the Amazon basin is covered with almost impenetrable tropical forests. In the Andean region the people are located, as might be expected, on elevated areas such as that upon which the old Inca civilisation developed in Peru.

The entire population of Australia—about seven million people, is about equal to that of greater London and is located mainly in the more fertile and temperate areas in the south-east and south-west. Despite its extent a great deal of the continent is sterile and incapable of supporting any but the smallest population. The northern parts are in the tropics and unsuited to settlement by Europeans. New Zealand has been more favoured by Nature, drought is unknown, and practically the whole country is capable

of maintaining a fairly dense population. To the west, however, the climate is decidedly wet, so that most of the people are to be found in the east. This is another case of the distribution of the population being associated with the relief of the land surface.

CHAPTER VIII.

THE PRIMARY OCCUPATIONS

Hunting communities—Tropical forest peoples—the Australian aborigines—the Amerinds—the Eskimo—the Norwegians.

In tropical forest regions there is a decided lack of natural food products, and starvation is an ever present possibility. Man in securing a livelihood always tends to follow the line of least resistance, and in the forests agriculture is impossible, for one thing the clearing of the ground is a matter of the greatest difficulty and can only be properly done by the use of good iron or steel tools. Primitive man can make clearings by burning, but this does not destroy the roots of the trees, so that cultivation afterwards is a very formidable undertaking and constant heavy labour is needed to check undesirable plant growths. The main occupation of the tropical forest dwellers is therefore hunting, and cultivation is only taken up when for some reason or another hunting fails, and it is promptly abandoned if again hunting becomes possible.

Hunting demands little foresight and, as in the tropics, food cannot be kept for more than one day, fresh supplies have continually to be obtained. If the hunters remain too long in one particular locality animals become scarce so the hunter is inevitably a nomad. Personal property is kept down to a minimum in order to facilitate movement.

The possessions of chief importance are weapons. Should agriculture be at all necessary it is carried on usually by the women and men too old to hunt, and settlements, if any will be situated on the banks of rivers where of cultivation is possible. All man's essential needs, food, clothing, and weapons can be supplied by hunting.

A hunting community is largely self-contained and tends to isolation. This arises from the difficulty of communication in the forests and naturally visitors are not encouraged within the tribal hunting area. The people only come into contact with the outside world when civilised countries demand forest products as for instance rubber. As a result of their occupation hunters are restless, and since they always carry weapons, are generally in a state of continuous war with other tribes. Life is little else than a perpetual struggle for food, the weaker tribes being driven off to preserve the food supplies of the more powerful communities. It is this struggle for existence which makes the forest hunters antagonistic to all strangers. The occupation demands agility, physical strength, and quickness of hand and eye, so that youth excels, and physical prowess is of greater importance than experience. It is the young men who take the lead.

Communities of this type are small—just one or at the most a few families. There is no opportunity for growth as a nation. Life of laborious with but little leisure, so that there are no opportunities for the development of industries or the arts. The men are all important as

providers of food, and other necessary work is relegated to the women. Constantly moving from place to place the men have always to be on the alert, and the women are the only available bearers of burdens, and are in a state of continual subjection. There is no civilisation or intellectual life. Representatives of this type are the negroes of the Congo forests, the Amazon forest pygmies, the people of the interior of New Guinea and the Malay Peninsula and the Veddahs of Ceylon.

Hunting tribes cannot expand, there is no excess of population owing to the scarcity of food and the hard life. Frequently they consists of the weaker peoples who have been driven to seek refuge in the forests

Man also turns to hunting for a livelihood on plains where the pasture is very poor and there are no animals which can be domesticated. Australia, before the settlement of Europeans, offered such an environment. Rivers are few and of uncertain flow, supplies of fresh water fish are meagre, and the natural vegetation is of little value to man as there are no important native food plants that warrant cultivation. The chief animals are numerous varieties of the kangaroo type. Australia, as far as natural endowment is concerned, offers little to promote the progress of man. On account of this difficult environment the natives were of a very low type, few in number, nomadic and barbarous. Their food consisted in the main of kangaroo flesh, snakes, birds and even larvæ and insects. The coming of the white settle was of little real help to them as the aborigines

produced nothing that could be sold, so they had no chance of gain. As might be expected the rate of mortality was very high, infanticide was prevalent and the weak and infirm were left to die. Cannibalism was a not uncommon practice. This is almost invariably a result of a deficiency of food and some of the Australian tribes have themselves accounted for it by the deficiency of game. The initiation of youths to manhood included ceremonies involving appalling tests, such as exposure to wounds and fire, as a proof of endurance, and to eliminate all but the strongest.

On the Australian plains travelling is a simple matter compared with the difficulties obstructing movement in a tropical forest, and, since there was no danger of attack from wild beasts, there was not the necessity for constant watchfulness and suspicion. Thus the Australian aborigines became less warlike and barbarous in comparison with, say, the hunting tribes of the Congo basin.

One of man's essential needs is salt, and the demand for this led to a primitive form of trading between the tribes of the interior and these of the coast regions.

Yet another type of hunting community is represented by the Indian of the North American plains* as he was before the advent of the white man. In the centre of this region between the highlands of the east and the Rocky mountains are vast plains, on the whole fertile but passing

* The American Indians are termed "Amerinds."

into desert in the south-west. Here, when America was discovered, there were no animals capable of domestication—the horse is a subsequent introduction from Europe. A kind of horse had existed before human beings came on the scene but had become extinct. The only cereal was maize which grows under sub-tropical conditions and requires much moisture. Game was plentiful, various kinds of deer, moose, wapiti, bison and, in the north, the reindeer, bears were common in the mountains to the west and there were also many kinds of birds that could be used for food. Waterfowl and fish were to be found in abundance. There was no lack of food and the people readily took to hunting as the easiest, and indeed the only possible means of subsistence. In addition to the abundance of supplies of animal food, many kinds of food berries grew in profusion—principally east of the Mississippi—without cultivation. Such an environment led to the development of highly developed hunting communities, far removed from the pitiable state of the hunters of the tropical forests or of the Australian aborigines. Since there was no lack of food no necessity arose for the destruction of children or the aged and infirm. Nevertheless permanent settlement was impossible as the tribes had to follow the migrations of the buffalo, but besides clothing and weapons the chase produced materials—skins, that with the aid of a few sticks, could readily be converted into wigwams (tents). Clothing was an important matter owing to the severities of the winter climate. The women and old men were the burden bearers. Despite

frequent wars, usually arising from disputes about hunting grounds, and human sacrifices, cannibalism was of rare occurrence. A fairly high level of social organisation was achieved—thanks to a plentiful food-supply, and a climate that was conducive to effort. A little leisure was possible in which attention could be given to other matters besides the mere quest for food, and ornamented head dresses and weapons were the outcome of an elementary development of the arts. In such an environment the American Indians, though hunters, had a chance of acquiring some of the more human qualities, and in their communities were to be found the elements of an intellectual and religious life.

The inhabitants of coastal regions, where the land has offered few possibilities for human maintenance, and where ready access to the sea has been provided by a broken coastline fringe with archipelagos, have tended to become hunters on the sea.

On the western coast of Greenland and on the islands of the Canadian Arctic Archipelago the climate is severe. For nine months of the year the cold is extreme and the summer is too short for crops to ripen, so that agriculture is impossible ; the only plants at all common are mosses and lichen and an occasional berry-bearing bush. The soil is scanty and the sub-soil remains frozen throughout the year. Here and there during the three summer months, the dreariness of the landscape is relieved by a few scattered meadows of bright coloured flowering plants.

As far as vegetation is concerned nature thus offers little for man's sustenance. The sea on the other hand teems with life : food fishes, seals and whales. Land animals such as the reindeer, bear, and hares, as well as, various sea-birds whose flesh is edible are fairly common ; the latter however migrate southwards at the approach of winter as do also the herds of reindeer. The Eskimo who inhabit these inhospitable regions have therefore become hunters both on land and sea. Land hunting is carried on mainly in the summer months when the Eskimo communities move from place to place in the wake of the reindeer herds. When winter sets in and the sea freezes hunting is confined to the sea, and, on account of the seal's habit of keeping open " blow-holes " in the ice their flesh and fat (blubber) are still obtainable. Among the drifting ice in summer, whale hunting is carried on.

The Eskimo are marvellous hunters, but limited by the primitive nature of the weapons they have to employ. A spear of bone or driftwood, tipped with a sharpened bone or occasionally iron, is their chief weapon. For clothing they use skins, sinews provide a substitute for thread, and the tents which are used as dwellings in summer consist of skins laid out of whale ribs or pieces of driftwood. The latter is brought down in considerable quantities by the big rivers of northern Canada and Siberia and forms an important item in Eskimo economy.

In the summer there are usually adequate supplies of food but in the winter reliance has to be placed largely upon supplies that have been stored. Then the tents give place to more permanent dwellings consisting of houses made of blocks of snow, entered by means of a long low passage in which it is possible to maintain a fairly high temperature. Occasionally stone, peat or turf may be employed as building materials.

For sea-hunting boats are necessary and these are made of whole ribs covered with skin. The smaller type used for hunting by the men is termed a "kayak", while a larger type—the women's boat is known as a "umiak". In the winter, when the frozen surface of the snow offers a suitable surface for their dog-sledges, the Eskimo does most of his travelling on land. It is a time of comparative leisure and rest and so is the time of inter-tribal communication. The summer is the time of work.

On account of their nomadic existence the amount of property is small, but greater than that of the tropical hunters, as the boats and sledges provide some facilities for transport. Since the numbers of the people are comparatively small and they are spread over a wide area, disputes as to the ownership of land or sea rarely arise and inter-tribal wars are practically unheard of. On the whole they are a peaceful and somewhat lethargic people; non-aggressiveness is a characteristic of sea-hunters generally. Famines occur occasionally and, because of the rigorous climate, the rate of mortality is very high especially among

the children and old people. One-tenth of the deaths are due to drowning.

They have become peculiarly adapted to their environment, in fact so much so, that they are helpless in other surroundings ; for this reason they have never expanded into other lands.

The natives of Tierra del Fuego also live under conditions which force them to secure food by hunting on the sea. This region, the southern most part of South America, has a deeply indented coastline backed by forest-covered mountains with a bushy undergrowth to an elevation of one thousand feet. The climate is cold and very wet. Owing to the steepness of the land surface and the forests penetration inland is difficult, and the summer is too short to make agriculture a success. Wild animals are scarce being limited to guanacos, a few deer and an occasional fox. In the sea, however, are seals, large and small, and many varieties of food fishes and shell-fish. Consequently the Fuegians have turned to the sea to secure a living. Since they lack proper tools their boats are primitive, but they wander in them day and night camping on the beaches, Even in the sheltered channels the sea is often rough, and stormy weather may frequently put a stop to hunting when starvation may ensue. Their lives are very hard and the rate of mortality is high. Leilaure is unknown and with nothing to trade they have had no chance of development ; they exhibit a total lack of organisation of any kind or of intellectual progress.

It would, however, be wrong to assume that people who are forced by their environment to become sea-hunters are invariably of a low type and without opportunities to attain a reasonable standard of development.

The fisher-folk of Norway belong to a land consisting of a lofty mountainous region with a coast of high cliffs broken by deep fiords and fronted by innumerable islands. Some of these fiords are hundreds of miles in length and behind the islands is a sheltered channel running along the coast for a thousand miles. An idea of the broken nature of the coastline may be formed when it is stated that the actual distance from south to north is only one-tenth of that which has to be covered if all the indentations are included. Norway is situated in a high northern latitude, but despite this the climate is relatively mild although wet. The soil is infertile and communication and transport are difficult, so that the land offers few attractions to man; the land animals, principally reindeer and hares are not plentiful enough to support a hunting community. The sea, on the other hand, is most prolific and large supplies of fish are easily obtainable. In the valleys, it is true, agriculture is carried on, but the area available for this purpose is very small. A few mining towns are the sole inland centres of population. The people live principally along the coast two-thirds are said to live within a mile of the sea.

For many centuries the Norsemen have been renowned for their prowess as sailors. In ancient times the Vikings—

the old Norse sea-rovers, sailed away in their vessels on long voyages of discovery of which however there are but few records. Our knowledge of their adventures is derived largely from the " sagas " which have come down through the ages by word of mouth, and in which fact and legend are hopelessly mixed together. They raided the coasts of Britain, made settlements in Brittany, and formed colonies in Iceland and on the Greenland coast. They touched Labrador but apparently did not penetrate to the more fertile inland regions. Consequently their discovery of the New world, long before the days of Columbus, was forgotten.

Successful navigation of the seas involved experience, so that the older men were the more important. The head of the family owned and commended the boat ; the women remained at home, cultivated the land while the men roved the seas and fished. Huting was thus combined with agriculture and the women held a comparatively high position as they played a definite part in the life of the community. During the long, dark winter months outdoor activities had to be restricted, which enabled attention to be devoted to industry and the arts. The marauding expeditions on the seas demanded co operation and organisation so that the people tended to progress socially and intellectually.

To day the Norwegians are still sailors and fishermen. They go out even in the storms and darkness of winter to meet the cod swarms in the neighbourhood of the

Lofoden islands. At this season there is in these high latitudes but one hour of daylight and the islands are deep with snow. As sailors they are among the best in the world as regards real seamanship. Among the crew of almost every trading vessel in the world are usually to be found one or more Norwegians.

Norway thus *exports* men simply because the land cannot support the population. A people of this type has always had considerable powers of expansion. From childhood they are familiar with seafaring and are capable of constructing good seaworthy boats from the plentiful supplies of raw materials provided by the coniferous of their land

As a rule hunters are merely destructive, but these communities of peasant fishers who combine hunting with agriculture, though as hunters they may destroy, yet as cultivators they develop the productive powers of the soil.

CHAPTER IX

THE PRIMARY OCCUPATIONS— (*continued*)

Pastoral communities—the Steppe dwellers—the peoples of the Tundra—Desert nomads.

To the east of the Caspian sea are the vast steppe lands of Central Asia. Here are great open plateaus and plains of poor grassland, having a climate of extremes with little rainfall. The rivers are intermittent, and there are few springs. In the heat of summer great areas become parched and; only here and there, fertile strips mark the river basins. There is a dearth of vegetable food ; locally cereals can be cultivated where there is sufficient rain during the season of growth. The animals are mainly herbivorous and capable of domestication.

In such an environment man's easiest mode of existence is to catch and domesticate the animals. The horse is a native of these regions, and once it was tamed life became a far simpler matter. From their flocks and herds the people can obtain skins for leather and tents, wool and hair for clothing—a very important item during the intense cold of the winter months. Similarly plenty of flesh food and milk are always available. From April to October a nomadic existence is inevitable since the community is dependent upon the prosperity of the flocks. They must be led from pasture to pasture and from one watering place

to another. During the hottest months the grass becomes withered and insect pests abound so that the animals are taken up to the higher feeding grounds and return to the lower levels as the cold weather comes on. Here they go into more or less permanent quarters for the winter to preserve the animals from the extreme cold. During the summer grass has to be collected to feed the flocks in the winter months.

The tents used for summer dwellings are light and easily carried, and on account of their horses these pastoral nomads are able to carry with them a larger amount of personal possessions than are other nomad peoples. Owing to the absence of trees the winter dwellings and stables for the animals are built of turf or platted rushes plastered with mud, roofed with thatch. The men take care of the flocks and herds, which involves much activity, care and experience; being accustomed to horses from childhood they become expert riders. The women milk the animals, prepare the hides, weave wool, and attend to the pitching of the tents—laborious but important duties.

Among such communities the idea of property is associated with *use* and the main items are the tents, clothing and the animals. Wealth is measured in terms of head of cattle and sheep. Large families are an advantage as there is no lack of food and the greater the number of individuals the larger the flocks and herds that can be controlled. Thus there is no infanticide or other primitive measures to restrict population. The sons seldom separate from their

parents so that large family communities are common. Youth and physical energy are of great importance, but experience is above all things essential ; the old men are consequently the rulers, and the social organisation is of the patriarchal type.

Pastoral nomad peoples tend naturally in the course of their migrations, to move into regions of greater fertility. Thus there have been great movements from time to time of the steppe dwellers into the more productive areas of Europe. Here they have settled, and, in some instances, have gradually taken up agriculture as their main occupation. One of the last of such migrations was that of the Turks, who, however, practically never turned to agriculture, probably because the regions into which they penetrated were better suited for pastoral activities. At the time of their greatest power they held the central Balkan lands and the plains to the south of the river Danube.

The extensive use by pastoral Peoples of land that is suitable for cultivation is economically extravagant, because the agriculturist if the soil is good can produce much more food on a given area than can the pastoralist. The latter thus tends to be excluded, and there is a continual contest between the cultivator and the herdsman.

Thanks to ample supplies of food and a certain amount of leisure, especially in the winter months when their ordinary activities are checked, the pastoralists are able to think of other things than merely securing the bare necessities of life. There are also at hand quantities of materials

suitable for manufacture so that industry tends to develop and they have an excess of goods over and above their own requirements with which they can trade with other peoples. The Central Asian nomads, *e. g.*, the Khirghiz barter rugs and blankets made of hair and wool with the Chinese to the east and the Russians to the west for tea, rice, wheat and similar commodities.

The early emigrants from Europe to North America became pastoralists—the “cowboy” equalled the Khirghiz as a horseman. But now the plains are coming more and more under cultivation ; wheat, maize and cotton are replacing pastoral products. Even the poorer grades of land can be made fruitful by the aid of irrigation, and the nomad pastoralists ultimately are driven to the regions where irrigation, for one reason or another, is impossible. As the land becomes increasingly in demand pastoral farming is carried on on a more intensive plan, the animals being restricted to ranches of limited extent. Irrigation is out of the question in the Asian steppe land so that here the nomad herdsmen are likely to remain undisturbed. Mention has already been made of the American cowboys of European descent and a further instance of how man’s occupations depend upon his environment is that of the British and Dutch settlers in Cape Colony. These are all descended from peoples who have for long been agriculturists but in South Africa the land is better suited for the pasturage than for cultivation, with the result that they have become pastoralists on a more or less extensive scale.

Between the coniferous forest regions of northern Eurasia and the Arctic Ocean lie the — *tundra* — vast areas of Arctic grassland. Here in summer the ground is covered by bright coloured flowering plants and many varieties of berry-bearing bushes. Birds are plentiful as also are insects ; indeed the great pest is the mosquito. The land is in many parts saturated with water, as the temperature is never high enough to cause much evaporation, and eighteen inches below the surface the soil is permanently frozen nor can crops ripen during the brief summer season, so that agriculture is impossible. Fishing is limited to the summer months as there are no seal "holes" in the ice in winter as with the Eskimo. The only animal that is of use to man is the reindeer which is kept in a domesticated state. These supply the people, Samoyedes, Tunguses, Chukchees and Lapps with food and clothing, and carry burdens and draw sledges over the winter snow. They are not big animals and provide but a limited quantity of milk. In summer the people move northwards and on to the higher ground to avoid the mosquitoes, wandering from place to place in search of pasture, living in tents which can easily be carried with them. With the approach of winter they move southwards and go into more permanent quarters, constructing dwellings of turf and similar materials. Besides the products derived from the reindeer, they are able to obtain furs which are of considerable value by hunting many small fur-bearing animals such as the ermine, whose fur is at its best in the cold season.

Conditions of life are rigorous and make for the survival of the strongest members of the community. There is but little food available for the animals in winter and the people have to rely to a considerable extent on dried fish stored up from the summer months. The population increases but slowly, and has little chance of expansion as movement is difficult except in winter months. Their environment forces them to become pastoral nomads of a low degree of civilisation. As a rule they are very dirty, primitive, and barbarous.

The Sahara desert separates fertile areas of the Mediterranean coast and the grasslands of the Soudan. One-third of this is a sandy waste and the remainder consists of rocky sterile tracts. Where the sand is not too deep the soil is fertile provided that adequate supplies of water can be provided. Towards the Barbary States are stretches of grass, and here and there are oases, the largest of which is that of the Nile valley, extending from the coast to the fertile lands to the south. The climate is very dry, hot, and windy, and, except in the oases there is no shade nor facilities for rest. Animal life is limited to insects, lizards, and that pariah of the animal world, the hyena. Long ago the camel was introduced by the Arabs, and, later, horses and goats. The camel is capable of living on the vegetation of the desert, however dry and thorny it may be, and can manage to exist for long periods without either food or water. Its feet are broad and padded which enables it to travel easily over the soft sandy ground.

Since transport is of primary importance in such a region it has been the means of making it possible for man to live in such an unpromising environment.

In the desert there is nothing to hunt, cultivation can only be carried on in the very limited areas of the oases. The population thus consists of small numbers of wandering herdsmen. In the outskirts of the region, where the land is less sterile, a somewhat more settled mode of life is possible. Throughout the year there is little variation of temperature so that special winter quarters are not necessary. For centuries the people have been wandering over long distances, making contact here and there with more progressive communities. At a very early stage the desert dwellers began to act as middlemen between the coast regions and the Soudan, and between the dwellers in the various oases. One of the principal items of trade has been, and is, salt. This, obtained from the coast peoples, is exchanged with those of the inland regions for wheat, dates, camel hair, leather and wool. For a long period definite caravan routes across the desert have been established and centres of exchange such as Timbuctoo, Dongola, and Bisra, have developed where the desert joins richer lands.

The great item of trade in the past was slaves and possibly to-day, in places, this traffic still continues. This arose from the difficulties of agriculture in the oases a very laborious and, to the Arabs, distasteful occupation. As among all nomads personal possessions are few, being limited by what the camels can carry.

The largest communities are to be found settled in the oases engaging in agriculture ; the true nomad groups being much smaller. Existence demands activity, physical strength and experience, so that a patriarchal organisation has developed. By force of circumstances the desert nomads are warlike. Trading caravans are a temptation to raiders so that every stranger is a potential enemy and, by way of retaliation, other caravans and the oases settlements offer similar inducements to attack. Thanks to their organisation, mobility, and good transport, they prove formidable foes. Curiously enough they have never attempted to seize richer lands such as the woodland areas of Central Africa, probably because the environment is so different from that to which they have for so long been accustomed. As a rule the lands most attractive to any people are those which differ but little from their own. The Arabs came to the Sahara from Arabia and at one time dominated a part of Europe, but here conditions were too difficult, so that the Moorish domination of Spain was but a temporary affair. They found in "Little Africa" the Atlas region in the north-west, an environment somewhat resembling that from which they had originally migrated, particularly as regards climate and vegetation. Here they remained, and are still masters of parts of this area to-day.

The high steppe lands of western China were the homes of the Mongols and Manchus who swept down upon the more effete agricultural peoples of the Hoang-Ho valley, whom they have dominated ever since.

Nomads act as an intervening link of carriers between more advanced peoples, as in the case of the shepherds of the Gobi desert who conveyed goods between eastern Europe and the Chinese.

In some instances where the land is more productive the people, while to some extent nomadic, adopt a more settled form of existence. The low valleys in Switzerland provide sites for the settlement of the Swiss agriculturists but in summer they are practically deserted as the mountain pastures become available for cattle-grazing with the melting of the snow. On account of this in the summer months the people have to move temporarily to the higher ground.

CHAPTER X

THE PRIMARY OCCUPATIONS —(*continued*) .

Agricultural peoples—Social consequences of tillage—Cultivation in the tropics and temperate regions—Mining,

Even among hunting tribes there are traces of the beginnings of agriculture. The aborigines of Australia for instance have a law prohibiting the uprooting of bushes which bear edible berries. On the steppes, in the tropical forests, and in the tundra region agriculture is impossible on account of climatic and other conditions. It is only where the natural conditions are between these extreme types that cultivation can develop, *i.e.*, where the most productive plants can be grown. It is in the river valleys of the warm temperate regions that agriculture began as an exclusive occupation and has developed to its most advanced stages. In the cool temperate regions the winter is a dormant period for vegetation so that here the cultivator must, in the summer months produce as much as possible, in order to be able to store up supplies of food for the winter. On account of the attention that has to be given to developing the earth's productive powers to the greatest extent it is in the cool temperate regions that the greatest agricultural progress has been made. There is no dormant season in the tropics so that no foresight is required regarding the provision of food for the winter as in temperate lands. The only

labour necessary is that involved in preparing the soil, sowing the crops and keeping the land free from weeds.

It must not be assumed that man's primary occupations hunting, herding and the tilling of the soil have followed, necessarily, any particular sequence. As far as we can tell any one of these may be as old as any other. Their origin is prehistoric and wholly obscure and each responds to some primitive instinct of man. Here are, it is true, certain links, between wheat and flowers and wild and domesticated varieties of animals but when the developments took place we do not know.

All the principal cereals, except maize, originated among the crops of the old world as did practically all the breeds of domestic animals including birds. The new world was not naturally endowed with many of the fruits and industrial crops in common use to-day.

The most notable effect of agriculture on man is the institution of settled conditions of life and the degree of settlement is closely allied to the degree of agricultural development. Primitive agriculture in the tropics is no bar to nomadism as it produces so large a return for little labour.

While the hunter is, as it were, entirely at the mercy of his surroundings, the cultivator can modify his environment ; by developing improved methods of work, he can bring about a great increase in the productive powers of the soil. There are no narrow limits to the growth of an

agricultural community. The soil is capable of supporting a dense population, even if all the cultivable area is occupied. Intensive methods add considerably to the possibilities of population in a particular region. Productive areas tend to become densely peopled.

The sedentary life of the agriculturist has a great effect upon the dwellings and property of the community. Possessions are not limited by the possibilities of transport. There is thus a great development of utensils and clothing, and, since the house is a permanent dwelling, much more trouble is taken with regard to its appearance and construction. It is an interesting fact that the style of building bears a close relation to local climatic conditions and the available material. In dry countries houses generally have flat roofs but in wetter regions they are generally pointed or ridged. Where the heaviest rain comes from a particular quarter, *e.g.*, the south-west, as in the south of England, the slope of the roof towards that quarter is often made longer than the other. Where soft and easily worked-wood such as that of coniferous forests, is plentiful, it forms the chief building material, as in Scandinavia and Russia. The village dwellings in the Ganges valley, where stones, rock and timber are scarce, are made of mud but, in the neighbourhood of the Aravalli hills in Rajputana most buildings of any size are constructed of stone. A similar difference is to be noticed between the houses in the south-east of England and those in the Pennine region of Yorkshire. Those in the former locality, where clay is

abundant, are made of brick, whereas the common building material in the other is stone from the local quarries. In the case of timber, or stone buildings the rectangular form predominates, where bamboo is employed circular construction is the more usual.

Where land is plentiful buildings tend to spread over the surface, but in places where, for one reason or another, it is limited they become crowded together and increased in height. The latter tendency is to be noticed in such widely differing places as desert oases and in the city of New York, and, to a certain extent, in London. In the oases land is very valuable as the fertile area is so limited and has to be used as sparingly as possible. The central section of New York is situated on a tongue of land between the Hudson river and the East River arm of the harbour bay. Building sites here are in very great demand, and in order to utilise the ground to the greatest possible extent, the "skyscraper" type of construction has been adopted, one building having a thousand or more tenants.

Agriculturists are not continually engaged in defence and attack, and are liable to lose their powers of resistance and fall an easy prey to more warlike peoples. Their occupation demands care rather than agility or fighting power, and of all things war is the most harmful to the welfare of the cultivator. His outlook becomes peaceful rather than aggressive. The more settled agricultural peoples of the sea board of "Little Africa" were subdued and dominated by the French about the middle of the

nineteenth century, but their control of the hinterland was but nominal owing to the great powers of resistance of the nomad tribes of the interior. Where, however, the soldier failed the engineer was successful, as by sinking artesian wells, artificial oases were developed, and in these some of the nomad tribes settled and adopted a more peaceful mode of existence. The Indian tribes on the more fertile and cultivable lands to the east of the Mississippi proved to be far less troublesome to the early settlers than the tribes in the western regions where the more sterile soil had impelled them to become nomad hunters.

Land ownership and slavery both result from agriculture. The occupation necessitates permanent rights over the land which in time leads to perpetual possession. Much hard work is required and some succeed while others do not, as a result of which the more successful become the employers of the labour of those who have failed. Agriculture is the only primary occupation by which man can obtain leisure without want, because in the vegetating period in temperate regions a surplus of food over and above the immediate requirements of the community can be produced and stored, man is led to realise that he can obtain a definite return for his efforts; he develops patience and thrift. His leisure gives him the opportunity to progress in arts, science and manufacture; with increasing comforts the needs of the community tend to develop, labour becomes more and more specialised and the social organisation becomes increasingly complex. The growing demand

for new comforts and luxuries promotes the development of trade and commerce. The long distance trade carried on by the primitive nomad peoples arises from the demands of the agricultural communities.

Thus agriculture makes for a high degree of civilisation ; experience is of the greatest importance and, in the course of time, families become peacefully combined together in tribes and nations. Women share the work equally with men, so that in these communities they tend to have a higher status than among hunters and pastoralists. The various civilisations of the world have all developed among agricultural peoples.

Agriculturists are as a rule very conservative, strongly attracted to the past and suspicious of innovations. They have every incentive to expand, and are well equipped for occupying new lands. As emigrants usually succeed because they settle firmly in their new homes and form new nations.

Tropical agriculture which involves the cultivation of crops as the banana, manioc, and rubber which are propagated by cuttings, does not encourage the development of such a degree of skill in the cultivator as does that of the sub-tropical and temperate regions where the crops are usually raised from seed. Maize is still the chief crop in North America while in India and in some parts of Africa millet is the most widely cultivated. Rice is the common crop where monsoon conditions prevail but it can only be grown satisfactorily in a somewhat limited

area. Its cultivation in low-lying tropical and sub-tropical lands is a laborious process. A great deal of moisture is needed, and irrigation is essential. With proper attention it is most productive and two and three crops a year can be obtained ; consequently rice-growing areas are capable of supporting a very dense population. It is the staple food of the people in China, Japan, Malaysia and Burma. In the rice lands the people are peaceful, sedentary, and have developed a high degree of civilisation and a complete social organisation.

Maize is a sub-tropical crop, a native of America. It requires less moisture than rice, for which reason it grows best on higher ground. Though maturing rather slowly it is very productive, and can provide food for a large number of people.

In the sub-tropical regions are the hot deserts where cultivation is only possible in the oases either natural or artificial. Here there is much water and plenty of sunshine which provide splendid conditions for plant growth. Owing to the very limited area every care has to be taken to make the best use of the land, water, and manure, so that agriculture tends to reach a high state of development. Under such conditions the peasants are forced to become skilled cultivators.

Cultivation in cool temperate regions is a later development, and here it now surpasses that of tropical and sub-tropical lands. In these regions there is, if anything, an excess of moisture, and a lack of sunshine, so that agriculture

though more productive than elsewhere is a more precarious occupation. By the difficulties with which they have to contend the people are stimulated to greater efforts and prudence and foresight are encouraged owing to the need for making provision for the dormant seasons. Such conditions are to be found only in northern hemisphere as, south of the equator the land area in corresponding latitudes is very limited. For this reason no indigenous civilisation is to be found in the southern hemisphere.

The longer the land is cultivated the more skill is required. In time the fertility needs renewing. One of the simplest methods by which this can be done is by a system of crop rotation, and this is definite characteristic of temperate agriculture. Under the old "manorial system" of western Europe six hundred years ago the arable land of the community was divided into three or four large fields by means of which a crude plan of crop rotation could be followed. "On the three afield plan one of the fields would be sown in the autumn with rye or wheat (the bread crop), one in the spring with barley (the drink crop) or with oats, beans or peas for the cattle; while the third was left fallow.*

Temperate agriculture is usually associated with the rearing of cattle and sheep. This is a means of utilising and reviving the fertility of the fallow fields. In the proximity of towns where there is a strong demand for milk,

* Ashley : *Economic Organisation of England*.

and similar commodities, the cultivator is often a dairy farmer as well. In warmer regions such a development would be hardly possible owing to the impossibility of preserving such commodities for more than a few hours.

The principal crops of the cool temperate lands are cereals ; of these, oats can be grown the farthest north as it can ripen during a short cool summer, and maize, farthest south. As has already been mentioned, it is the development of agriculture in these regions that has brought about the destruction of deciduous forests.

Mining can hardly be regarded as a primitive industry. It gives no direct support to man, so that either it must be a subsidiary occupation, or food-supplies must be secured from elsewhere. Primitive people, as a rule, engage in very little mining, which, in their case, consists of little more than gathering easily obtainable ores of metal. Intensive mining is the outcome of the demands of highly developed peoples.

Metallic ores occur chiefly in the older rocks so that large scale mining is mainly carried on where there has been a good deal of disturbance of the earth's crust and subsequently, much denudation, which has exposed the older strata. Sometimes borings are made through layers of newer rocks to the older rocks beneath. This, however, is a late development and can only be undertaken where the community has reached an adequate standard of scientific and mechanical progress.

It is not a permanent occupation, as sooner or later, the mineral deposits are exhausted. While it lasts it promotes a sedentary existence for man, but, especially in certain regions the settlements are distinctly of a temporary nature. Transport facilities are of the greatest importance, failing which it may be impossible to work the deposits as in Malaysia. As the value of the minerals increases it becomes possible to lay out the capital needed to overcome transport difficulties, and the mines can be developed. Another essential is water, and, where the deposits are rich enough to bear the cost, water may be brought for hundreds of miles to the mining settlements as at Koolgardie in Western Australia. The proximity of other minerals suitable for fuel and fluxes may have much influence on the exploitation of metallic deposits.

Surface mining, the most elementary stage, consists merely, as the term implies, of collecting supplies of minerals from the earth's surface. It may precede the development of deep mining, unless the surface strata bear no relation to those below. The only requirement for this occupation is food, neither skill nor capital are necessary, and it is frequently but a temporary affair. The principal metals thus obtained are gold, platinum, tin, and, to a lesser extent, lead and iron.

Gold always is found in a pure state so that no process of reduction is necessary, and the first stage in every gold "rush" is alluvial mining. This has a greater and more sudden attraction for human beings than perhaps

anything else. The work is immediately remunerative, no skill nor special tools are needed ; the produce —gold dust, can be easily transported, and will find a sure market. Sooner or later the alluvial deposits are exhausted, and then it becomes necessary to discover where they originated. The place of origin may be far distant, as these deposits are due to the action of rivers, possibly in ages gone by, in bringing down material from higher regions in which gold occurs in the rocks over which the water has been flowing. If the original source of the metal is remote then the alluvial mining will cease abruptly. On the other hand if it is near, deep mining will develop.

In deep mining excavations are made in hillsides or shafts are sunk vertically into the earth. Continuous work at one spot is demanded, and this leads to the development of permanent settlements and towns. The population grows and in time the locality becomes densely crowded. (Surface mining does not result in a dense population in the one limited locality as the workers are spread throughout the valley) Labour becomes increasingly specialised, not merely in mining processes, but also in connection with the distribution and production of food. A high degree of skill is necessary, and scientific knowledge becomes more and more important. Intellectual as well as physical ability is demanded. The organisation of the community becomes more and more complex, especially with the development of manufacturing industries. Such communities have no relation to local food supplies ; they

depend upon the production of a surplus in other regions. Traders and merchants become important, and a highly developed transport system is a primary necessity. As time goes on, and the density of the population increases, villages spread, leading to their unification as towns, these, in turn, unite and become the big urban areas characteristic of a mining and industrial region.

The check to such progress would be the exhaustion of the mines—a long process in the case of coal, or the utilisation of other means of power-production. The use of water-power is increasing, especially now electrical power can be economically conveyed over long distances. This eventually may lead to a transfer of the world's industrial centres to the Alps, Scandinavia, the Highlands of Scotland, and Eastern Canada, where vast amounts of water-power are available. Another factor that may help in this direction is the enormous cost of land in densely populated areas. In recent years there has been an increasing movement of factories out of London for this reason. It is notable too that railway workshops are rarely situated on the coal-fields. This tendency is most prevalent in small industries in which little coal is needed.

The mining of precious metals, and stones, is, in most cases today, an ordinary industrial process carried on by joint stock companies with the aid of large amounts of capital, and but rarely does one find instances of the "get-rich-quick" rushes of years ago. To get a fortune and go away as soon as possible was the aim of the old fashioned gold

miner. He formed no attachment to any particular locality, and the temporary mining populations were liable to come into opposition against the settled agricultural communities. Fortunately, however, the mining areas were generally in dry, mountainous regions where agriculture could not develop. The South African war of 1899-1902 was the outcome of disputes between the miners and the agriculturists of the Transvaal.

Agriculture may be promoted as a result of mining, although, owing to the attraction of the latter, large numbers of men hitherto working on the land, may abandon cultivation and go off to the gold fields. Not every prospective miner is, however, successful, and, once the first excitement of the 'rush' has disappeared, many may settle down to agriculture in the more fertile areas. The demand for food-stuffs of the mining camps may do much to encourage the efforts of those who are capable of tilling the soil.

CHAPTER XI.

THE PROGRESS OF CIVILISATION.

Three main periods—the Phœnicians, Greeks, and Romans—The Italian City States—The Portuguese and Spaniards.

Civilisation is often used to denote the development of a high degree of workmanship and mechanical skill, but this is to employ the term in a very limited sense. It really implies a definite degree of social organisation in which the needs of the individual are subordinated to the needs of the community. Moreover it involves a high development of intellectual power on the part of some individuals, which expresses itself in the investigation by scientific methods of problems, *e.g.*, those of philosophy and religion.

Almost all the world's indigenous civilisations developed in the Old World, and in the northern hemisphere, and outside the tropics. Mexico, and Peru, the centres of Aztec and Inca civilisations respectively, are in tropical latitudes, but here altitude compensated for latitude, and the centres of population in each case were situated on high plateaux amid temperate climatic conditions.

This predominance of civilisation in the Old World was due in the first place to the fact that here man was established long before he appeared elsewhere, also on account of the greater number of suitable sites, *i.e.*, large alluvial

valleys, which are comparatively rare in the New World. Food plants and animals that can be domesticated are practically all native to the Old World, where there is also an abundance of land in warm temperate regions.

The early civilisations of China, Indo-China, Northern India, and Mesopotamia, were separated from each other by high land, steppes, and deserts. Thus in ancient times there were no links between them. This accounts for their stationary aspect and the little influence they have had upon the world as a whole. The wider influence of the Japanese is an outcome of a much later development due to a cultural drift to the islands from the Chinese mainland. Japan is insular, and with the development of ocean transport, the nation had to spread over the sea. It has been really a case of other nations forcing their influence on Japan. The civilisation of the Mekong valley never developed to any notable extent on account of the limited area suitable for habitation.

In the Near East man became civilised at an early period, which involved a great increase in the populations of the Nile and Euphrates valleys. Expansion from the Nile valley could only take place towards the north as to the south were the marshes of the Bahr el Ghazal, and, to the east, and west, the desert. Similarly the peoples of the Euphrates valley were forced to expand to the north-west where the headwaters of the rivers approach within a few days' march of the Mediterranean. As a result of the converging of these two civilisations Cyprus became of the

greatest importance in the early history of the Mediterranean.

The Inca and Aztec civilisations of the New World could not expand because the crop, *i.e.*, maize, on which they depended could only be grown on a limited area. To the north of Mexico are the deserts of Arizona and to the east only a narrow, densely forested coastal plain. The highlands of Peru were barred to the west by hot deserts and to the east by dense tropical forests. The only instance of their expansion was the development of the Maya civilisation in the Yucatan peninsula. This, however, was unstable and of relatively brief duration. Geographical environment may thus explain why these civilisations did not spread, but it cannot explain why they collapsed. It was not due to the coming of the Europeans, as they had begun to decay before the Spaniards reached America. The fact remains that they did perish.

Three main periods can be distinguished in the development of civilisation in the Old World. From the earliest days of man until about three thousand years ago was the "river" period. On the alluvial lands agriculture developed, and the consequent prosperity fostered man's progress spiritually and intellectually. With the evolution of the arts and industry boat building improved, and the Mediterranean became the medium of human intercourse. Thus began the second stage, *i.e.*, the *thalassic*, or inland sea period.

In those far-off days boats were primitive, instruments for navigation such as the compass, chronometer, and sextant were unknown, but the Mediterranean offered facilities to voyagers which enabled them to travel throughout its length despite these drawbacks. It is a narrow sea surrounded by high land, the coasts are dotted with lofty headlands easily visible for long distances through the clear air. There are numerous harbours providing excellent shelter for small vessels, and the winds are usually steady and light. Such conditions favoured the primitive voyagers who could readily ascertain their positions by observation of the coastal highlands and never be far from adequate shelter in the event of rough weather. Consequently the Mediterranean became the world's great nursery of seaman-ship, and as time went on, and man became more accustomed to sea voyaging, he was able to go further and further afield.

The earliest voyagers were the Phœnicians, dwellers in the valley of the Orontes the only fertile region to be found in northern Syria and the natural route between the Euphrates valley and the Mediterranean. The only outlet from the Orontes valley was westward, so that by force of circumstances the Phœnicians became the middlemen between the Babylonian peoples and the west. To the Phœnicians came caravans bearing goods from the east, and ships bringing cargoes from the lands bordering the sea. Spices, pearls, ivory and ebony from India, and silk, cotton and precious stones from China. The peoples of

the Black Sea region, the Pelasgians, sent by sea horses and copper, all of which could, through Phœnician agency, be exchanged for corn and slaves from Egypt. For the purpose of making bronze, (for the early Mediterranean period coincides with the "bronze age"), tin was in great demand, which induced the Phœnicians to sail to the west and, *via* the Iberian coast to the Scilly isles on the outskirts of Britain. These voyages led to the founding of trading stations along the Mediterranean. notably Cadex now Cadiz to the west of the Straits of Gibraltar—the ancient "Pillar of Hercules". They also built vessels on the Red Sea coast, and by this means travelled eastwards to Persia, India and Madagascar.

At length the power of the Phœnicians waned, and the Carthaginians became the predominant power in the Mediterranean. Carthage commanded the routes between Europe and Africa and was within easy reach of the rich lands of north-eastern Africa, the Sahara and Sudan. They held sway over the western part of the Mediterranean for about five hundred years.

The Phœnicians and Carthaginians were purely traders and when the channels of trade were changed, their power rapidly diminished. Their colonies were solely trading stations, urban communities lacking the stability of agricultural, peoples and, despite the fact that there are scarcely any written records remaining of their achievements, there is no doubt that their civilisation involved a high degree of intellectual development.

Following the Phoenicians came the Greeks as the dominant Mediterranean power. The regions they inhabited were very mountainous and rather arid owing to a light rainfall and porous soil. Between the small alluvial valleys in which cultivation could be carried on communication was difficult. On the coast, however, were numerous harbours, and island fringes protected the shores. Thus the people were forced to the sea and became notable as sea-traders. Along the shores of the Mediterranean they founded numerous trading stations and a few colonies, in Cyprus, Sicily, in southern Italy, and Massilia, where now stands Marseilles. None were founded in Little Africa which was the scene of the activities of the Carthaginians.

In the course of time Greece declined and Rome's sway over Europe and eastern Asia began. One of the factors that undoubtedly caused the decline of Greece was the lack of unity among their different states resulting from the physical relief of the country. Long after their power had gone the Greeks, as was the case with other ancient peoples, retained their civilisation.

With the rise of Rome, civilisation began to move to the west. Its progress was partially the outcome of Greek influence but other factors also helped. Rome began as an outpost of the Latins against the Etruscans, the people of Tuscany, among whom a minor civilisation had developed, and who had been powerful enough to prevent the Greeks from trading on their coasts. As far as the rise of Rome is concerned fewer explanations can be given

geographically than in the cases of the Phoenicians and Greeks. The region about Rome was more fertile than that of Greece, so that the main interest of the people lay in agriculture rather than in seamanship or trade. Apart from the drawbacks of a malarious region, Rome was the centre of one of the best agricultural sites in the western Mediterranean. Their occupation as tillers of the soil tended to make the Romans sedentary. Their vast empire, which at one time, included practically the whole of the known world, was held by force and rested upon neither trade nor settlement. Among the factors which led to its collapse may be mentioned the exhaustion resulting from constant wars, and the growth of habits of idleness and luxury. Agriculture became more and more the work of slaves, and the persistence of malaria did much to undermine the mental and physical powers of the people. Historically Rome's power succumbed to the attacks of the Goths and Vandals.

By the middle ages the trade of the Mediterranean had become a definite factor of western life, and certain trading communities arose having but little influence on land. Italy's central position with ready access to southern and western Europe made it a suitable region in which such communities could develop. The earliest of these was Amalfi on the gulf of Salerno, which traded with Constantinople, Cyprus, Alexandria and Tunis. Later came Pisa at the then head of navigation of the river Arno. This, in turn, was superseded

by Genoa, which has a natural harbour and fronts the narrowest part of the Apennines. Thus it has comparatively easy access to the fertile lands of the Po basin, beyond which lie the Alp passes leading into northern and western Europe. Subsequently Florence arose as a result of its proximity to the rich wool-producing region of the Apennine foothills. By the fall of Pisa, Florence was given access to the sea.

Of all these communities the greatest degree of progress, in the widest sense, was attained by Venice. The city was situated at the head of the Adriatic Sea—on the deltaic lands of the Po estuary. Separated from the mainland by swamps, and protected seawards by stone beaches it was almost impregnable—no mean asset to a rich city in those days of strife and uncertainty. Nominally, if not actually, many parts of the Mediterranean coasts came under Venetian control. Not only did the city become a great entrepot between east and west, but the importation of goods led to the development of numerous manufacturing industries such as leather, armour, lace, glassware and jewellery. The chief imports were spices and precious stones while olive-oil, wine, corals, and various metals were the chief exports. For a long period Venice controlled the importation of luxury articles into Europe. En route the various commodities passed through the hands of various middlemen which did much to bring wealth and progress to various other cities, *e.g.*, Aleppo, Damascus, and Alexandria.

When the Turks captured Constantinople in 1453 the Mediterranean trade with the east came to an end. Trading communities like Genoa and Venice rapidly lost their prestige and the third era of civilisation—the oceanic period, began

Now, for geographical reasons, it was the seaboard countries of Europe which became prominent and influenced a wider world. The Mediterranean countries having no direct contact with the ocean became of little importance, neither for a long time did the lands of northern and eastern Europe make any notable contribution to the world's progress. The Atlantic ocean became important because by this time man's skill in navigation and shipbuilding had made great strides, and voyaging no longer was limited by the necessity of hugging the shore, as the compass and quadrant (an early form of sextant) were available. There had also been great advances in astronomical knowledge.

The pioneers of ocean travel were the Portuguese. Their country adjoined the Mediterranean region and for a century the people had been acquiring knowledge and culture. They had come into contact with Africa by the seizure of Morocco on the expulsion of the Moors. On the Atlantic coast was the estuary of the Tagus providing a good centre for oceanic development. In 1475, Bartholomew Diaz rounded the Cape of Good Hope reaching Algoa Bay, and twenty-three years later Vasco da Gama following the same route arrived at Calicut. All along the

west coast of Africa they opened up trading stations which eventually became centres of the slave trade, and the nucleus of the latter day Portuguese territories in Africa. The names of many of the islands in the Atlantic still remind us of their discovery by the Portuguese. As the importance of Venice diminished, Lisbon became the centre of overseas trade. Like the Italian communities, the Portuguese were traders purely and simply, as the limited population prevented any attempts at settlement or colonisation. In fact one of their greatest difficulties was the relatively large number of men needed to man the ships, not merely as navigators, but for protection against the Arabs in the Indian Ocean. By the middle of the sixteenth century they had almost secured a monopoly of eastern trade. Bengal, Malaysia, and China all contributed to the wealth of the Lisbon merchants.

Portugal's power, however, was shortlived. Administrators had repeatedly protested against the great dangers that might result from the heavy drain of men involved by these trading activities in far distant lands. The trading stations had no real stability and in the event of the trade being checked disaster was bound to ensue. The jealousy and cupidity of other nations was aroused and they began to seek access to the riches of the East for themselves. Columbus, a native of Genoa, conceived the then novel idea of reaching the Indies by sailing westwards. The Genoese, fearing lest their monopoly of Eastern trade should be disturbed refused to give any support to the project. At length after a weary succession of appeals for

aid, he managed to secure the help of Ferdinand and Isabella, king and queen of Spain. In 1492 after a momentous and difficult voyage, with an unwilling and rebellious crew, he reached one of the most northerly of the Bahama islands off the coast of Florida. Seven years later the Spaniards reached the mainland.

The discovery of America gave a great impetus to Spanish overseas activities. In the first place, by dint of searching there were hopes of yet finding a way through the new continent to the Indies, and a lucrative trade rapidly developed in the products of the newly discovered regions. At length Magellan discovered the straits that bear his name and Spanish vessels opened up a route to the East Indies *via* the Pacific. The distance was shortened considerably by goods being conveyed by mule trains across the mainland between the Pacific and Atlantic coasts. Inevitably Spain and Portugal came into conflict over the question of dominance in the East. The dispute was settled for the time being by a "Bull" issued in 1493 by which the Pope directed that the regions east and west of a meridian roughly 47 degrees west of Greenwich should be controlled by Portugal and Spain respectively. Unfortunately this decision ignored the fact that the world was round, and since the Philippine Islands had been discovered by voyagers from the west they were nominally within the Spanish sphere of influence. As a result they were, for long, disputed territory.

For many years Spain concentrated all her energies on a frenzied search for wealth in the New World, lured on

by reports of the treasures of the Aztecs and Incas, As in the case of Portugal, a small population had little inducement to indulge in settlement overseas ; the only reason for venturing abroad was the hope of getting rich quickly, and while the whole of America except Brazil came under Spanish influence, the actual Spanish overseas population was never very great—probably 15,000 at the most. The colonies were merely conquered territories held by force, of that the empire thus rested on a very insecure foundation. Later there were certain small settlements based upon cattle-rearing in Colifornia, and sugar-growing Cuba which eventually gave rise to the slave-trade. This also was encouraged by the demand for labour in the silver mines of Mexico.

The Spanish colonies continued until the nineteenth century, when one after another they broke away from the mother country. In most cases the separation was a simple, peaceful affair because for long Spain's dominance had been traditional rather than effective. Nevertheless distinct traces of Spanish influence exist to-day in the language and outlook of the peoples from the southern regions of the United States to Patagonia.

Spain obtained but little foothold in Africa, her territory being, in this continent, limited to the Moroccan and Algerian coasts. These were purely military outposts held against the piratical peoples of the Barbary region.

CHAPTER XII.

THE PROGRESS OF CIVILISATION--(*continued*)

The Dutch—the French and British—the Japanese.

The prosperity of the Dutch was, in the beginning, a result of the nature of the organisation of the Portuguese overseas trade. As has been stated above this was centred at Lisbon from which port the Dutch used to act as distributors to the peoples of north-western Europe. As the trade of Lisbon declined the Dutch began to tap the eastern trade for themselves. These people of the fertile lands of the Rhine delta had attained a high degree of civilisation, resulting in a dense population and increasing wants were a great inducement to the development of their trading activities. Their coast region also favoured the growth of seamanship and, with the decline of Lisbon and the rapidly increasing rivalry of Spain, they were, it may be said, compelled to develop an overseas trade.

As a result of their agricultural origin they were naturally of a pacific outlook, which led them to avoid, as far as possible, interference with existing trade routes and settlements. They left the Portuguese and Arab traders of the Indian ocean alone, and pushed farther to the east opening up trade with Malaysia and China. For about a century they limited their activities purely to commercial development. Their trading stations were few and manned as economically as possible, thus avoiding the

mistakes that had been made in this respect by the Portuguese. Along all places in Africa, Table Bay became their port of call for the refitting and revictualing of their ships voyaging to the east. This being in the temperate regions was suitable for European habitation and in time became an agricultural settlement as well as a trading station—the first European settlement in Africa. In the Malay Archipelago they traded on an extensive scale ; whole islands became but Dutch plantations. Today Holland's only possessions outside Europe are in the East Indian islands.

The Dutch trade began to diminish in the earlier half of the eighteenth century partly on account of British competition, but also because they had instituted an unwise policy of attempting to set up monopolies in connection with their commercial activities. Thousands of acres of crops and large quantities of the commodities themselves were deliberately destroyed for this purpose. This merely produced scarcity and enhanced prices which attracted the attention of potential competitors. Ultimately prices fell and the monopoly was lost. As has already been mentioned the British East India Company was inaugurated because of the high price of pepper. Ships too had become larger so that bigger cargoes could be carried which tended to bring prices down. There were, also by this time, no opportunities for the Dutch to launch out into the production of new commodities, as their lands had been devoted solely to the production of a limited number of commodities. Thus it

happened that the bulk of their trade passed into the hands of the British.

To a limited extent eastern trade was also indulged in by the French from the middle of the seventeenth century. Madagascar became their headquarters for this purpose and here they attempted to start a settlement. The conditions however were too different from those of the mother-country so this project was doomed to an early failure. In India they were fairly successful, and, unlike those nations we have already considered, they aimed primarily at territorial acquisition. They made no attempt to specialise in commerce, but wasted their energies in efforts at colonisation. Their sway in the East collapsed before the rivalry of the British. It had no stable foundation neither in settlement nor trade, and disappeared as rapidly as it had arisen. Pondicherry, the principal French trading centre was, by nature of a convergence of river routes the key to southern India, and its fall reacted fatally upon their influence in the East.

By the time the British began to devote attention to the East the sea-route had become well established. A long indented coastline which provided good shelter for shipping had for long accustomed them to seafaring and seamanship. On land they had had a varied environment which had given ample opportunities for progress in agricultural and industrial activities. Moreover, isolated from the continent of Europe by the sea they had had unique opportunities for relatively undisturbed development in

comparison with the war-racked countries of the mainland. Nature had thus conferred upon them remarkable facilities for maritime activity and overseas expansion when the opportunity should arise.

The first British trading station in India was Surat, not far from Bombay, at the head of the Tapti valley which facilitated access into the Deccan plateau. Madras was of greater importance as it commanded routes giving easier access to the interior, despite its inferiority as a port. Surat was soon superseded by Bombay, and Calcutta was placed relatively at a great disadvantage when the Suez Canal was opened in 1887.

Further east, Malaysia, Singapore, and Hong Kong soon came also under British control.

Through the agency of companies formed to promote overseas trade and settlements, Britain's influence in the seventeenth and eighteenth centuries spread throughout the world. Not only in the East but in various parts of Africa and Canada were laid the foundations of the empire. The North American colonies broke away, but this was balanced to a certain extent by drawing attention to the possibilities of Australia. New Zealand was acquired in the first place to prevent the French from becoming too serious arrival to British expansion in the southern Pacific.

The story of the British Empire apart from that with which we have already considered, is a matter rather beyond the purview of the geographer since the scramble for African territory was the outcome of the industrialisation

of western Europe. This development occurred earlier in the United Kingdom than in other European countries so that Britain led the way in the efforts to secure control of regions which could provide raw materials and take manufactured products in exchange. The basis of subsequent expansion has thus been the growth of Britain's industry and trade.

Japan's remarkable achievements in the nineteenth century have been in the main the result of western peoples forcing their civilisation upon her. The contact of the Japanese with Europe goes back to the wonderful journeyings of Marco Polo some six hundred years ago. For long, however, they adapted a policy of rigid exclusion of foreign ideas, and only comparatively recently did Japan awaken to the fact that other nations had progressed far beyond the level to which her people had risen. Once this was realised the Japanese did all they could to bring themselves into line with the West as quickly as possible ; the result of the Russo-Japanese war indicated clearly how successfully they had done so.

Although, perhaps in the first instance, these developments can hardly be traced to the influence of geographical conditions, except in so far as her coasts are easily accessible by sea, yet in the history of Japan the effect of physical factors can be traced without much difficulty. The country is in some respects like the United Kingdom. It consists of a number of islands of varying extent with very broken coast-lines. The surface is very rugged and subject to volcanic and seismic disturbances.

It extends to the south of the Tropic of Cancer and, in the north, is subject to a very cold winter climate on account of the proximity of cold currents from the Arctic ocean, and the outblowing winds from the intensely cold Siberian region to the west. A warm current washes the southern shores and the meeting of this and the cold northerly currents make fog very prevalent in the winter months. The islands are fairly fertile as a whole but the area of really good land is very limited. Fortunately fish are plentiful round the coast and this with rice forms the main items of the people's food. The population has outgrown the local food resources, and but for legislative barriers the Japanese would have spread to other regions far more than has actually been the case. To the west across a narrow sea the Amur valley offered an easy means of ingress to the Asiatic mainland and to the south the Korean peninsula offered a further opening for Japan's teeming population. The islands of the Pacific, California and Australia have all been looked upon with longing eyes, but in America and Australia such emigrants are not encouraged. Despite the importation of foodstuffs the Japanese, especially with the rapid industrialisation of their country, are in a most difficult position, the result of which is the "Problem of the Pacific" which is a matter of much anxiety to statesmen all over the world. Japan has thus been forced by the natural conditions of the country to develop as she has done. Nature, as it were, made her people ready to take their place among the world's powers when the right moment came.

CHAPTER XIII.

SLAVERY

Slavery related to agriculture—the Negro—the influence of the slave-traders in Africa—slavery a temporary phenomenon.

With the growth of wealth and an increasing appreciation of leisure man has always tended to call in the aid of his less fortunate and progressive fellow-men to do the more laborious and distasteful work in the community, *i. e.*, he becomes an employer of labour. As his ideas become more and more humane, and he begins to appreciate the common humanity of the race, the conditions of the employed improve, but until this spirit has developed the lives of the working classes are, in the main, very hard indeed.

The idea of labour being based upon definite contracts between the employer and the employee is a comparatively late development. Man in a primitive (moral rather than intellectual) state has no compunction in using force to compel others to do the tasks for which he is disinclined. Thus for long ages in the story of man we find a record of communities existing largely by the efforts of slaves, members of other communities who have been taken in battle or obtained by purchase from their captors. These have occupied a debased and isolated position in the social organisation of the community. They have been regarded merely as goods and chattels entirely at the mercy of their masters.

It is to be noticed that slavery has resulted from an increase of wealth and an opportunity for leisure. Now we have already seen that of the primary occupations agriculture is lucrative and does not demand the incessant effort as do hunting and pastoral activities. Thus it is among agricultural peoples we may expect to find slavery. The nomads of the Sahara and other desert regions who gradually adopted a settled mode of existence in the fertile oases found the cultivation of the soil very laborious and distasteful, with the result that they began to make use of the labour of those whom they captured in their warlike raids upon less powerful communities. The peoples of Egypt, Greece and Rome at the periods of their greatest progress employed very large numbers of slaves. As time went on the people became increasingly devoted to habits of ease and luxury : more and more of the essential labours of the community were left to the slaves. This meant a weakening of the social structure which eventually did much to bring about the collapse of the social organisation.

In northern Europe the manorial communities included large numbers of landless workers who were but little else than slaves. These " serfs " were the lowest grade in the community, and were entirely at the mercy of the lord of the manor and his subordinates. Their origin is obscure, but it is usually agreed that they were the remaining members of earlier communities which had been overwhelmed by invaders from elsewhere. It is to be

remembered that these manorial communities were essentially cultivators of the soil.

The development of ocean navigation leading to the opening of the "Cape route" to India and the discovery of the New World began a new era of slavery. The Dutch settlers in South Africa were dominated by the idea that the negro was intended to be nothing else than a slave, and this attitude has been a constant source of friction between them and the subsequent arrivals, the British. In the New World owing to their small numbers and the climatic conditions the Europeans needed help, at first in the silver mines and later in cultivation. A ready source of labour was found by which thousands of negroes were torn from their homes in Africa and transported to the other side of the Atlantic. When slavery was abolished in British territory the West Indian islands suffered a severe economic setback. The liberated slaves refused to work as wage-earners in the plantations because with a very little labour a small patch of ground in those fertile regions would provide them with a living. Moreover, since slavery continued in Brazil for twenty years after it had been abolished in the West Indies, the British planters, in addition to losing their slaves, had to face the competition of the slave-produced commodities of Brazil. Consequently there followed a long period of severe economic depression in the British West Indies.

The question of negro slavery illustrates how an agricultural environment under certain conditions may

bring about the evolution of a type of man which leads itself easily to slave labour. Sir H. Johnston has said that the " negro is a born slave ". The cultivable areas of tropical Africa are very productive and a little intermittent labour is sufficient to supply the limited needs of man. The people thus tend to indolence, while owing to the uncertainties of life amid the innumerable enemies in such regions, disease and tempest, to say nothing of wild beasts and warlike races from neighbouring regions, the negro cultivator tends to develop a stolid indifference to the vagaries of his existence. Thus on the whole the negro races lead to be easy-going, cheerful, peaceable and fatalistic. Consequently, when brought into contact with more energetic and dominating peoples, they have so frequently become the slave workers of the community.

A slave-owning people may acquire great wealth, but such a community has within it the seeds of its own destruction, and its prosperity can be but temporary. Sooner or later, as history clearly shows, the leisured class becomes increasingly enervated, and falls behind in the race for national progress.

Much of the exploration of Africa has been due to slavery. The great source of slaves was the Soudan and the grassland regions further south. For ages the Arabs penetrated into the depths of the "Dark Continent" in pursuit of the negro. They unfortunately left no records of their adventures, which is hardly surprising since all hunters, whether animals or of men, cannot be expected to give information

regarding the locality of their best hunting-grounds. Similarly the Portuguese, although we have traces of their wanderings in ruined buildings such as those at Zimbabwe, have told us nothing of their earlier explorations. Records of the slavers remain however in certain-settlements in the basins of the West African rivers whence the slaves were exported to the Americans. The long established trading stations at the mouths of the Senegal, Gambia and Niger rivers originated in this way. The republic of Liberia owed its establishment to an experiment in the repatriation of negroes from America when slavery was abolished.

Finally we realise that slavery, in the history of man is a temporary phenomenon. With the development of civilisation man comes to understand, that it is an offence against morality. To-day we find much earnest effort being devoted to abolishing this blot on humanity wherever it continues to exist, and in time, doubtless, it will be a thing of the past. It is but a transient phase in the growth of civilisation.

CHAPTER XIV

COLONISATION.

The origin of colonies and dependencies—emigration and climate—relation between settlers and native peoples.

Our survey of the world's development would not be complete without a consideration of the origin and progress of overseas settlements. Of these two kinds may be distinguished, *vis*, colonies and dependencies. The essential characteristic of the former is the common nationality of its settlers who have come in sufficient numbers to bring with them their civilisation. In a dependency the bulk of the population is native to the country but the ruling power is in the hands of an alien race.

Among the overseas possessions of various countries the following types are to be found : those created or acquired by military power but not settled to any appreciable extent, as for example the outposts of the old Roman Empire, the former Spanish possessions in the Americas and British India. Next there are regions peopled by an immigrant population engaged in the main in agricultural activities, *e. g.*, New Zealand, parts of the Union of South Africa, Australia and Canada. A third kind are places whose principal link with the home country is trade and commerce. These are usually centres which import manufactured goods and export raw materials and various other tropical products. Of this type were the trading ports of

various European nations in Africa and those of the East India Company in India. With them may conveniently be included certain places acquired in order to maintain control of trade routes such as Gibraltar. There are also those where agriculture is the chief occupation but in which the population is mainly native, *i.e.*, plantations. Among these are to be included most of the tropical possessions of European countries, as for example Java and the West Indian islands. The last type are penal settlements. These are small and of little economic importance, except in so far as the stigma inevitably attached to a convict origin, may check the immigration of free settlers, as was formerly the case in New South Wales. Existing settlements of this kind are those of the French in New Caledonia and Guiana.

A more simple division merely distinguishes between two main types, *i.e.*, military-posts, trading stations, plantations and penal settlements, and secondly, agricultural settlements, and trading posts which have been established by individual enterprise.

Of all varieties agricultural settlements are the most permanent and stable ; trading posts are somewhat less so, while military outposts are the least productive.

Generally speaking it has been the desire for trade, and pressure, of population, and the attractions of more productive lands, that have brought about the establishment of settlements overseas. These factors are due to increasing progress in the home country leading to a growing demand

for foreign goods. Pressure of population is perhaps the most important cause in view of the fact that it leads to the growth of permanent overseas settlements. This will, naturally, operate mainly in overcrowded industrialised countries where the local food supplies have become inadequate. The attractiveness of more fertile regions produces much emigration from agricultural land as shown by the outflow of Scandinavians to America. Other motives also have a similar effect as for example the exodus of Russians which has resulted from political oppression in their own country. In an industrial country, however, prosperity is more uncertain than among agriculturists, so that in the former case emigration usually occurs to a far greater extent than in the latter. The emigration from the United Kingdom has thus been far greater than from France since the end of the eighteenth century. Again, the need of industrial regions for raw materials and markets, has done a great deal towards their peoples establishing centres of settlement overseas. Germany became industrialised somewhat later than other European countries and the difficulties the nation encountered in finding unoccupied territory for colonial development undoubtedly had much to do with the outbreak of the Great War in 1914.

It is interesting to note, in connection with migration, how people tend to move into regions in which climatic conditions are similar to those of the home country. Emigrants from Great Britain and other countries of the

east, west, and north-west Europe have gone chiefly to Australia, New Zealand, the United States of America and Canada. In America the Spaniards, Portuguese and Italians go to California, and the southern parts of the United States. Scandinavians to Wisconsin, Minnesota, and Dakota, while Icelanders are attracted chiefly to the sub-arctic areas to the north of Winnipeg. As regards South America, European emigrants go generally to the Argentine region south of the La Plata estuary and Uruguay. The majority of these are Italians who find in the pampas an environment resembling that from which they have come. Further south, in Patagonia, are large areas of cool temperate grassland but this does not appeal to the emigrant from the sunny Italian climate, and the distance prevents any extensive immigration of Scots or Irishmen apart from the fact that the government is foreign and the common language is Spanish. Thus apart from a small Welsh colony at Puerto Madriga, Patagonia has not attracted people from Europe to any notable extent. In the Falkland Islands, really a part of Patagonia, the soil is poor, resembling that of the highlands of Scotland, and suitable only for sheep-farming. Here is a small colony of sheep farmers descendants of some Scottish shepherds who arrived years ago.

Before concluding our study of these matters we must devote a little space to the question of the interaction between emigrant peoples and the native inhabitants of a colony or dependency.

There are, it is true, in a few places, instances of there having been no existing native peoples. Where this is the case no particular social difficulty has arisen, except possibly between immigrants of different nationalities. These cases are, however, of but minor importance and need not detain us further.

Three cases may be distinguished according as the native inhabitants have been exterminated, the two races live side by side, or, lastly, the races intermarry and a new race is produced.

Extermination of the native people has only taken place when the environment has been suitable for colonisation by the immigrant people on a large scale, and the native population has been small and of a low degree of development. History shows that a primitive nomad race tends to disappear when the land is invaded by a colonising peasant people. As has been mentioned in a previous chapter the agriculturist leaves no room for the activities of a pastoral people. In North America the aboriginal Amerind population—a purely nomad people, was very small, badly equipped for war, but expert in strategy and woodcraft. Gradually they were dispossessed; a few became tillers of the soil but, to a great extent, they were exterminated. To day they are only to be found in isolated desert or mountain regions, and in State reserves. Even in the reserves they are rapidly dying out, although the policy of deliberate extermination has been long since abandoned. It is estimated at the present time that there are less than one million remaining in the whole of North America.

The Australian aborigines, when the colonists first arrived, were in a very primitive state, having progressed no further than the "stone age". Extermination was rapidly carried on a large scale and the brutality of the early settlers is a sad blot of an Australia's history. To day there are a few in the deserts of the west and interior, and in the east, in reserves. The race tends to disappear, but it has been felt that eventually they may prove suitable for labour in the tropical parts of the dominion. In this way possibly a remnant of these very primitive people may be preserved. Similarly in Tasmania the natives were deliberately exterminated except a few who were established in a special settlement on Flinders island. These, however, gradually died out, and the last of the Tasmanian aborigines had disappeared by 1876.

New Zealand provides a further illustration. The Maories are Polynesians of a high racial type and had made considerable progress as a result of a helpful environment. With the coming of the white settlers there was at first a prolonged period of war. At length the Maories were subdued ; nevertheless they secured a definite position in the colony's social organisation. Now they are fully accepted as citizens, and have to a great extent adopted the civilisation of the colonists. A part of the north island is specially reserved for them and they are mainly occupied in sheep and cattle-farming. This is regarded as a case of extermination in view of the increasing reduction in the numbers of the aborigines owing to a rapidly declining birth-rate.

In South Africa the negro and white races live side by side, and in both cases natural rate of increase is high—particularly among the Dutch as regards the white peoples. When the Dutch first arrived the Cape region was only occupied by a few nomad Hottentots and Bushmen, but to the east, the Bantu peoples were steadily pushing southwards. The colonists drove the Bushmen into remoter regions mainly to the west, and then began the contest between the Dutch and the Bantus for the possession of South Africa. Later came the British, who to a great extent attempted to mediate between the two clashing peoples. At the present time the negro is as prominent in South Africa as is the European, and in most parts of the region natural conditions favour the negro more than the colonists. It seems possible that ultimately the former may be predominant. The situation is an extremely difficult one on account of the small number of white people being as it were submerged in a vast negro population. Owing to the existing difference in the degree of civilisation between the races, there is inevitably a barrier of prestige between them, which might, if the situation were not wisely handled, lead to a racial conflict. Fortunately there is as yet ample room for both races to expand, but should competition for land arise, the situation may become serious. Here there can be no question of extermination. The environment, as has been mentioned, is admirably suited to the negro and his presence cannot be ignored. There seems as yet to be no satisfactory solution in sight, but it may be hoped that if due facilities are given the

negro population as a whole may be raised to a higher social level which might render the situation less acute.

Races tend to mix freely when the environment is equally suitable to them both. In " Little Africa " (*i.e.*, the Atlas region) the present inhabitants, the Moors, originated by a mixing of the Arabs and Berbers following the Arab invasion. It is now difficult to find traces of the separate peoples. The Magyars of Hungary have resulted from a mixing of Mongol invaders with the native inhabitants, and in Scandinavia the Lapps have intermarried with the Swedes and Norwegians, which is said to account for certain differences to be noticed between the inhabitants of the south and north.

This mixing of peoples is a very common phenomenon and Australia appears to be the only colony in which such mixing between the immigrants and natives has not occurred to any appreciable extent. When it arises between races of widely differing levels of development and outlook it frequently produces the most difficult social problems.

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